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**Fluctuations in intergenerational mobility in economic status in
Norway**

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Abstract

Changes in intergenerational economic mobility is studied on the basis of register data on the earnings of the total population of mothers, fathers and children from 1967 and onwards. The analyses focus on the earnings of the cohorts born between 1955 and 1973, and their earnings at the age of 29-30 and 39-40, for those who have reached this age in 2003. Parental economic status is measured by father's earnings as well as mother's earnings added on. The estimates of mobility vary a great deal, according to measurement procedures and age at measurement. The lowest level of mobility is found in the estimates based on the father's earnings only. The results do not support the argument in previous research that intergenerational economic mobility has increased in Norway.

I. Introduction

One of the important questions in the social sciences concerns the degree to which society is open. To what extent are people's opportunities to succeed determined by their social origins? Is there a development towards increasing openness? Within the sociological tradition, answers to this question tend to be based on studies of occupational mobility, as well as studies of inequality in educational opportunity. Within economics there are a growing number of studies that focus on intergenerational inheritance of economic position. However, researchers in the field observe that we still have limited knowledge, due to the problems with gathering good data on the income of two generations in nationally representative samples (Mazumder 2005). Moreover, the conclusions about the magnitude of inheritance of economic position have been shown to vary greatly according to measurement procedures. Among other things estimates of economic inheritance tend to be larger when they are based on long-run economic position rather than single-year observations (Solon 1992, Zimmerman 1992). The data situation with respect to the possibilities of studying intergenerational earnings mobility is considerably better in Scandinavia than in most other countries, because researchers have access to large samples that even may contain information about the total population. This is for example the case in Norway, in which national data registers have

been made available for researchers containing population information on earnings on an annual basis back to the 1960's.

The conclusions from Norwegian studies with respect to changes over time in inequality of opportunities are somewhat in disagreement. Whereas the studies of occupational mobility and inequality in educational opportunity have emphasised the high extent of stability over time (e.g. Ringdal 1994, Hansen 1999), the as yet only study of intergenerational earnings mobility has come to a different conclusion. In their study of four Norwegian birth-cohorts, 1950, 1955, 1960, and 1965, Bratberg, Nilsen and Vaage (2005), conclude that earnings mobility in Norway is high. Moreover there is no tendency of decreasing earnings mobility. On the contrary, they argue, some of their findings indeed indicate that mobility has increased over time, at least among men. They end up by discussing the possibility that increasing income mobility is the result of educational reforms aimed at enhancing "equality of opportunity along the socioeconomic dimension" (p. 433). These conclusions received considerable attention in Norwegian media. Under the heading "Easier to climb socially" in the major Norwegian newspaper *Aftenposten*, one of the authors, Øivind Nilsen, declares that economic inequality is reproduced to a lesser extent than was the case earlier (*Aftenposten* 2005-08-02). Their research indicates, he continues, that the impact of the level of earnings of the fathers on the future of their children has steadily decreased.

The main focus here is on the development of intergenerational mobility over time in Norway, but it can also be noted that Bratberg, Nilsen & Vaage (2005) (hereafter BNV), argue that intergenerational earnings mobility in a comparative perspective is high in Norway. They also note that the trend seems to be in the opposite direction than what seems to be the case in Great Britain (Blanden et al. 2002). In their discussion intergenerational economic mobility in a comparative perspective, Björklund & Jantti (2000), conclude that mobility seems to be especially low in the United States and the United Kingdom, as compared to other countries (cf. also Österberg 2000). But they call for caution in the interpretation of comparative differences when putting together the estimates as they are often not very precise.

Several arguments can be raised against the conclusions of BNV. First, of all, it is clearly questionable to draw conclusions about trends on the basis of a very limited

number of observations, such as done by BNV. In the case of BNV, their study encompasses three cohorts that have reached the age of 35 in 1995; the most recent year income is observed. Clearly, conclusions about long-term trends based on so few observations may be misleading. If three observations differ this may indicate that the level of economic mobility fluctuates, for example in correspondence with economic cycles, rather than being a sign of a trend. In this paper annual measures are reported; the complete development in the period is thus exposed.

Second, previous studies of income mobility clearly bear evidence that estimates of mobility are highly susceptible to data quality and measuring procedures. The problem that has gathered the most attention is the downward bias caused by using single-year earnings as a proxy for long-term economic status. Thus Becker's estimates of intergenerational correlations of about 0.2 in the United States were adjusted upwards to around 0.4 in analyses averaging earnings over four or five years (Becker 1988, Solon 1992, Zimmermann 1992). BNV are fully aware of the problems connected to single-year as opposed to multi-year measurement of economic status, and compute a number of measures based on single-year, two-year or more observations of earnings. However, they seem less aware of the impact of other measurement procedures, and the procedures they choose contribute to a downward bias in the estimates. Some problems concerning data and measurement are discussed in the following section. Then analyses are presented that suggest that BNV's conclusions about trends and levels of economic mobility are misleading. These analyses make use of Norwegian public register data containing information on earnings used as a basis for estimating the size of pensions. The data includes the earnings of the total population of mothers, fathers and children on an annual basis from 1967 and onwards. The analyses presented here are based on the cohorts born between 1955 and 1973; the development in nearly two decades is thus covered.

II. Sources of Variation in Estimates of Intergenerational Earnings Mobility

One source leading to downward bias in the measurement of economic mobility is the age at which father's income is measured. The transitory component of earnings, or the "noise", follows a U-shaped curve during the lifecycle (Baker & Solon 2003, Mazumder 2005). The transitory component decreases from the mid twenties, is smallest for people in their 40's and then rises sharply among people in their 50's. This means that the measurement of father's earnings ideally should take place for fathers in their 40's. BNV measures income when the children are 17-21 years old, which means that the typical father tends to be in his 50's, the age at which studies have shown that the transitory component is large. This paper measures income when the children are aged 12 to 16. The fathers then typically tend to be in the beginning of their 40's.

The point about measurement age also is relevant for the age when measuring the economic status of children. BNV base their conclusions about change on people that are relatively young, around the age of 30, at the stage when the transitory component of earnings is large relative to a decade later. This choice may also influence their conclusions about change over time: During recent decades the time people spend in educational institutions has expanded, thus labour market entry, except for student jobs, is postponed until the end of the twenties' (cf. also Blanden et al. 2002). The proportion of Norwegian 28 year-olds still in education doubled, for example, from the beginning of the 1980's to the mid 1990's. Whereas around 10 percent were registered in some sort of education in 1983, this was true for around 20 percent in 1995. This proportion has since then been relatively stable for men, but has increased somewhat for women.

If economic mobility is measured around the age of thirty, then, this means that an ever larger proportion of those who enter careers that over time yield high earnings will be in the beginning of their career at the stage when their income is measured. This most likely will influence the association between family income, or fathers' income, and own income measured at the age of 30, but not necessarily at a more advanced age when higher education graduates tend to have moved upwards in their careers. To avoid basing conclusions exclusively on younger people, this paper presents analyses of inheritance of economic status both at the age of 29 to 30 and the age of 39 to 40.

A further problem concerns the measure of parental economic status. Mazumder (2005) points out that using two-parent income instead of merely father's earnings leads

to an upwards adjustment of the measures of economic elasticity from 0.35 to 0.55. His point is that including all sources of income of both parents gives a better estimate of economic status than when merely using father's earnings, as is done by BNV as well as a in a number of other studies. The Norwegian register data used here only includes information on earnings. It is not possible to include other forms of income, such as various forms of capital income,¹ but the mothers' earnings are available. Including the mothers' earnings in measure of economic position during childhood must be supposed to be increasingly important over time, as mothers work more outside the home and their contribution to the household economy increases. The analyses below present results based on solely earnings of fathers, as well as a composite measure with the mother's earnings added on.

The final problem addressed here concerns the treatment of zero or missing observations, which has large consequences for the magnitude of the estimates of intergenerational income mobility. Couch & Lillard (1998) show that exclusions of those having low incomes contributes to a downward bias in the estimates of intergenerational earnings elasticity and argue that screening should be made according to other criteria than earnings. Björklund & Jäntti (1997) compare the result of analyses both with and without observations with zero earnings, but conclude that their main results are fairly similar. BNV have chosen to follow the procedure in previous research of including incomplete series (cf. Österberg 2000), but omitting zero observations in their computations. This means, for example, that the computation of the five-years average in a series including one zero will be based on the four non-zero observations. They are not entirely clear as to how they treat missing, as opposed to zero, observations, and they do not report whether other procedures would lead to other results.² Österberg (2000) reports results based on both complete and incomplete series, and the estimates of economic elasticity based on the complete series are somewhat lower than those based on both complete and incomplete series.

There is a mixture of problems presented by zero and missing observations. For example, one or two zero observation in a series of five may indicate that the person is out of work those years, or perhaps has become a disability pensioner, something that influences the long-run economic status of that person. Disregarding the zeros and basing

the measurement of earnings solely on the years with non-zero earnings will lead to an overestimation of the long-run economic status of the person, as the economic consequences of being out of work or becoming a disability pensioner, for example, are disregarded (cf. Couch and Lillard 1998). We also may have cases in which the parents and children have zero earnings in the whole period, which in this paper as explained above, includes five years for the parent generation and two years for the children. With the usual methodology in studies of income mobility, which involves using log earnings, such persons are entirely excluded from the analysis. Disregarding those with zero earnings thus to some extent involves excluding those who fare worst with respect to economic status.

However, we may also envision that zero, and also low earnings, in fact may camouflage a far more advantageous economic position. The measure of earnings may be influenced by the fact that the data are assembled for official purposes, to estimate taxes as well as pension rights, so those who give information about earnings to the authorities will be interested in minimizing their earnings. The possibilities for doing this has been far greater for those who are self-employed than for employees, therefore the earnings measure in the pension register is likely to be the least accurate indicator of the economic situation of those who run their own businesses. A much noted phenomenon in Norwegian newspapers is for example zero-tax contributors, i.e. people who are known to be wealthy but still do not pay taxes. If there are systematic tendencies in this direction, they most likely will lead to an underestimate of inheritance of economic status.

The ambition here is not to solve all the problems linked to zero, missing or low observations of earnings in the public register on earnings, this would be a too extensive task for this paper. However, estimates of economic inheritance based on complete series of earnings, which assumedly are most “unproblematic”, will be compared to the estimates based on the procedures used in previous research, i.e. of including incomplete series but excluding the missing observations in the computation of mean earnings.

III. Data and Measurement

The data set contains the full birth cohorts between 1955 and 1973. Information is included on annual earnings of fathers, mothers and children from 1967 and onwards. Annual earnings include earnings both as employees and as self-employed, but exclude capital income such as that from stocks and bonds, interests on loans, etc.

Intergenerational economic persistence or rigidity within each of these cohorts is estimated in accordance with common practice as

$$y_{1i} = \alpha + \rho y_{0i} + \beta_1 \text{Age}_{0i} + \beta_2 \text{Age}_{0i}^2 + \varepsilon_i,$$

where y_{1i} measures economic status, here the log annual earnings of the sons or daughters, and y_{0i} is the corresponding measure of fathers income. Age and age squared refers to father's age. It is also common practice to include the children's age and age squared, which does not apply here, because all children in each model are of similar age. As described above, the impact of parental earnings, with mother's earnings added on, is also analysed. The coefficient of interest is ρ , which may be used as a measure of intergenerational mobility. A ρ close to 1 indicates a society in which children inherit the economic position of the parent generation, whereas the smaller the ρ , the more mobility. A ρ close to 0 bears evidence of an open society in which the economic situation of the father (or parents) has no impact on the economic success of oneself. In order to study development over time, ρ is estimated separately for the men and women in each birth cohort in the data set.

To avoid measuring mobility at the age at which the transitory component is large, father's earnings are sought measured around this age when the fathers most typically are in their 40's. This study encompasses cohorts born nearly 20 years apart, at a time in which parental age at birth has varied somewhat. However, if we compare the cohorts born between 1955 and 1973 the mean age of fathers when the children 12 years old varies between 40 and 43 years, that is, when fathers older than 54 are excluded. This is done to avoid including old-age pensioners in the analysis, which is unwished because their economic position is unrepresentative for their status before becoming a pensioner. Father's earnings are measured as mean earnings during the years when the children were

12 to 16 years old. This means that father's earnings for the years 1967-72 are used for the birth cohort of 1955, 1968-73 for the 1956 cohort, and so on.

Analyses based on two treatments of the father's earnings are presented. First, analyses including series with zero or missing observations, but in which the computation of the mean is based on valid and non-zero observations. Second, analyses in which all individuals with fathers having incomplete series are excluded. The same procedure is used for family earnings, which adds the mother's earnings to the father's.³

To study whether the development in the level of intergenerational inheritance of economic position differs during the life cycle the children's earnings are calculated at two ages, 29-30 and 39-40. Missing and zero observations are treated the same way as for the fathers, i.e. the mean is based on one value if the earnings for the other year are zero or missing.

Table 1 gives a description of the data. The first two columns report the mean age of the father, when the children were 12 years old, as well as the standard deviation, excluding fathers older than 54. We see that the mean age has decreased in the period, but the period when fathers age is measured is the period at which previous studies indicate that the variance of transitory innovation is at its lowest levels (Mazumdur 2005: Figure 2.2.). The following columns report the means and standard deviations of father's and family earnings, as well as children's earnings at the two stages that are analysed. The final columns report the number of observations and the proportion with complete series, i.e. series with no missing or zero observations of father's earnings. We see that around 90 percent have complete series. It may be added that around 3-4 percent have no valid observations of father's earnings, whereas the remaining 6-7 percent have between 1 and 4 valid observations.

Table 1. Descriptive statistics

Cohort	Father's age		Father's earnings		Family earnings		Son's earnings 29-30		Son's earnings 39-40		Daughter's earnings 29-30		Daughter's earnings 39-40		N Fathers 16-54	Percent complete
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
1955	43,21	5,49	12,14	0,50	12,23	0,48	12,17	0,63	12,36	0,82	11,25	1,14	11,78	0,92	55543	90,93
1956	43,21	5,52	12,17	0,53	12,26	0,51	12,19	0,63	12,38	0,79	11,31	1,11	11,79	0,93	56651	90,54
1957	43,04	5,53	12,20	0,55	12,30	0,52	12,23	0,63	12,42	0,76	11,39	1,07	11,85	0,88	55965	90,65
1958	42,96	5,60	12,22	0,56	12,34	0,53	12,22	0,66	12,46	0,77	11,42	1,09	11,88	0,87	56352	90,27
1959	42,88	5,68	12,26	0,58	12,38	0,54	12,18	0,70	12,49	0,77	11,42	1,10	11,92	0,87	56599	90,30
1960	42,72	5,71	12,28	0,59	12,43	0,54	12,16	0,72	12,50	0,80	11,47	1,09	11,95	0,89	55882	90,24
1961	42,57	5,73	12,32	0,59	12,48	0,52	12,15	0,75	12,51	0,81	11,54	1,04	11,97	0,91	56859	90,24
1962	42,35	5,79	12,35	0,59	12,52	0,52	12,14	0,78	12,55	0,75	11,56	1,07	12,04	0,82	56983	90,12
1963	42,14	5,82	12,38	0,59	12,57	0,50	12,12	0,82	12,57	0,72	11,61	1,03	12,10	0,80	58322	90,43
1964	41,89	5,83	12,40	0,58	12,61	0,49	12,13	0,82			11,64	1,02			61293	90,27
1965	41,64	5,87	12,40	0,56	12,64	0,48	12,14	0,79			11,67	1,00			62881	90,27
1966	41,31	5,82	12,40	0,56	12,65	0,48	12,17	0,76			11,69	1,00			64048	89,98
1967	41,03	5,77	12,39	0,54	12,66	0,46	12,21	0,75			11,73	0,96			64142	90,32
1968	40,75	5,64	12,38	0,57	12,66	0,47	12,27	0,73			11,76	0,95			65708	89,87
1969	40,61	5,57	12,38	0,57	12,66	0,48	12,31	0,74			11,81	0,94			66552	89,74
1970	40,45	5,47	12,38	0,58	12,68	0,49	12,33	0,75			11,83	0,94			64299	89,21
1971	40,35	5,34	12,40	0,61	12,71	0,50	12,34	0,77			11,87	0,92			65482	89,18
1972	40,25	5,21	12,41	0,61	12,74	0,50	12,38	0,70			11,94	0,85			64494	88,98
1973	40,29	5,11	12,42	0,63	12,75	0,51	12,39	0,70			11,99	0,82			61808	88,39

Notes: Father's age when child was 12 years old. Fathers below 16 and above 54 are excluded
All earnings in log of 1998 NOK. Percent complete is the proportion of fathers' with no missing or zero observations.

IV. Results

Figure 1 shows the development of intergenerational earnings mobility for men aged 29-30, measured by the coefficient ρ in the regression model described above estimated separately for each cohort. We see that the level of mobility varies considerably according to the measure of parental earnings. The lowest level of intergenerational rigidity is found when only father's earnings is included, and missing and zero observations are treated as by BNV and Österberg (2000) (the line labelled "Father"). Still, the estimates of rigidity are higher than the comparable estimates reported by BNV, which are 0.91 for the 1955 cohort and 0.90 for the 1960 cohort at age 30 (cf. BNV Table 3). This is primarily the consequence of measuring father's earnings at a younger age than done by BNV. There also seems to be a slight downward trend in the 10 youngest birth cohorts. However the highest coefficient, and consequently the lowest level of mobility, is found for the 1962 cohort.

Intergenerational rigidity is considerably higher if the incomplete series are excluded, as seen in the line labelled "Father complete". The coefficient increases by approximately 20-50 percent, varying somewhat among the birth cohorts, compared to the analysis including all fathers. This is a large difference, considering that the only

change is that the 6-7 percent having fathers with incomplete series, i.e. between one and four zero or missing observations, are omitted from the analysis. A closer scrutiny through doing analysis with variables measuring complete/incomplete series added, as well as interactions terms between complete/incomplete series and father's earnings, shows that there in fact is no positive association between the incomes of fathers and sons for this group with incomplete series (not shown here). Including them therefore contributes to lowering the measure of rigidity for the group as a whole.⁴

A downward trend is also evident for the cohorts born after the mid-sixties in the estimates based on fathers with complete series. Such a development is not so evident in the estimates when the mother's earnings are added to the father's. We also see that the measured rigidity among the youngest cohorts is highest based on the family measures. This may bear evidence of a development in which the mother's earnings become a more important contribution to the economic status of the family.

The analyses presented in Figure 1 indicate that the level of intergenerational mobility fluctuates, and that the level of rigidity seemed to increase in the birth cohorts from about 1960 to 1964. They were 29-30 in the beginning of the 1990's, a period with economic downturn and high unemployment rates. The economic cycles turned around 1994, at which point we see that the level of intergenerational earnings rigidity according to all measures of parental economic status decreased. An interpretation close at hand is that economic cycles influence the level of mobility, and that rigidity will tend to be highest in periods with with the greatest economic difficulties. However, the decrease in the two youngest cohorts is hard to explain in this manner, as the beginning of the 2000's was a period with growing unemployment rates.

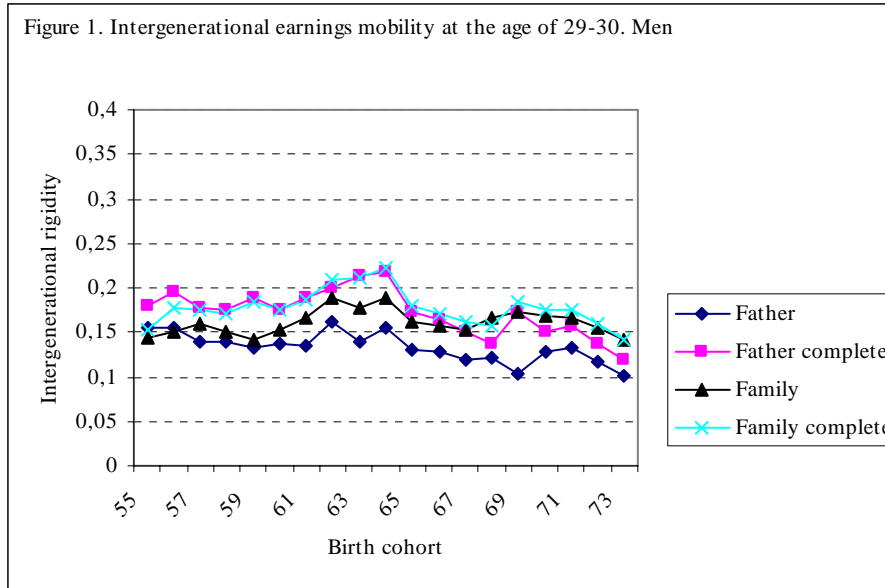


Figure 2 shows the results of similar analyses for the women as for the men. It may first be noted that intergenerational economic rigidity at this age seems to be higher among the women than the men. A further interesting pattern is that a clear downward trend can be seen if intergenerational rigidity is measured by father's earnings. As for men there is a considerable difference depending on whether all fathers are included, or only those with complete series. However, no downward trend is evident when the point of departure is family earnings. The estimates of intergenerational rigidity fluctuate around 0.30 in the analyses based on the "complete" series of family earnings.

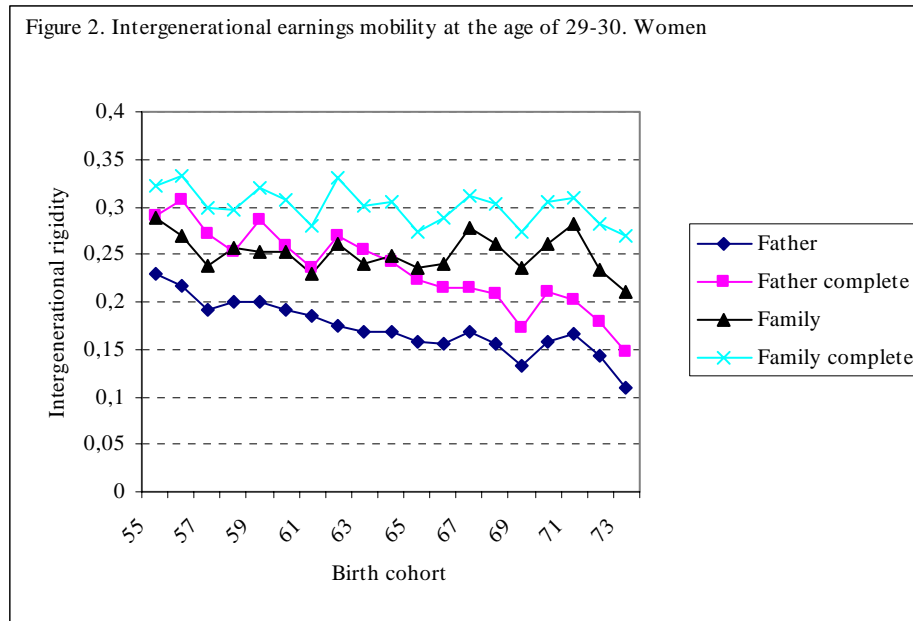
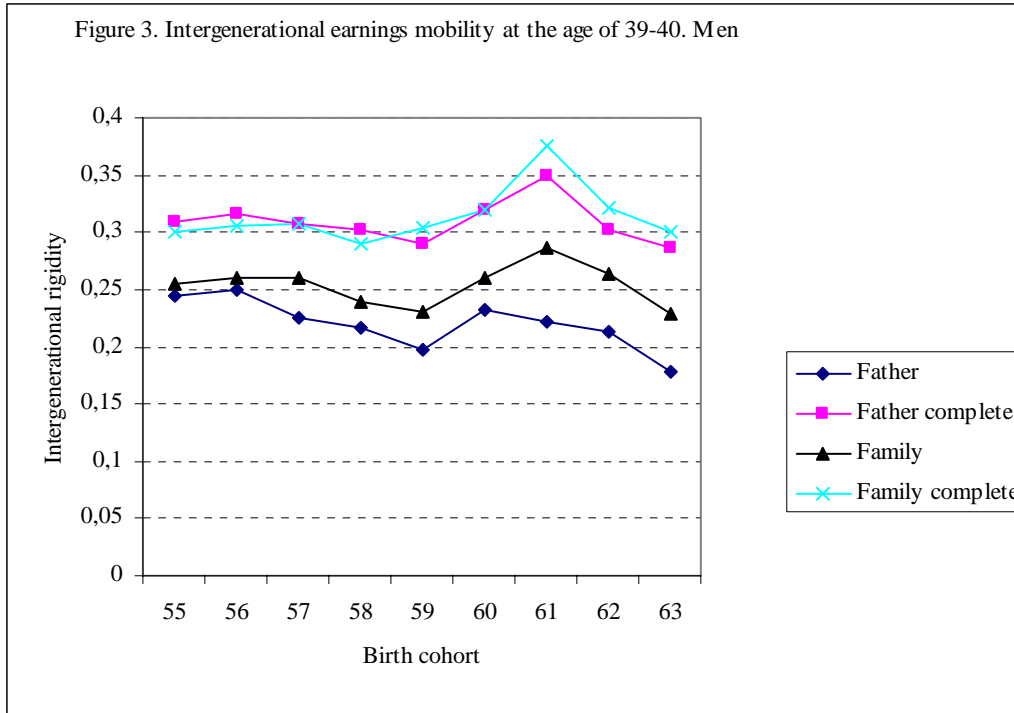
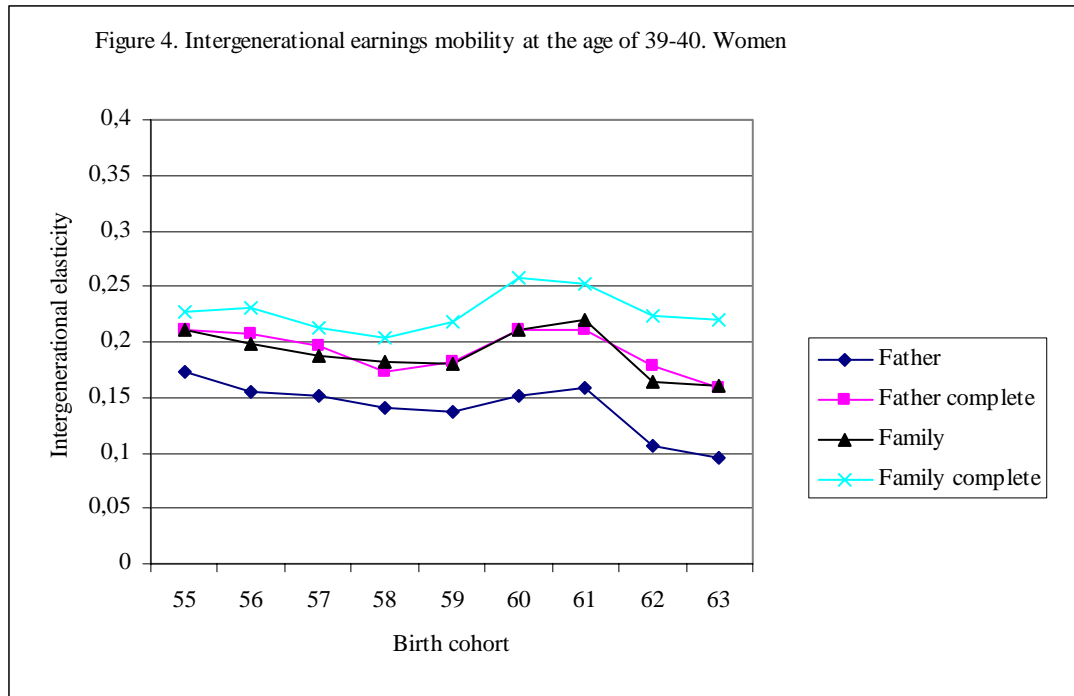


Figure 3 shows intergenerational earnings mobility among men at the age of 39-40, for the nine oldest cohorts included in the analyses in Figure 1 who as yet have reached this age. We first note that the level of intergenerational rigidity has increased considerably, compared to Figure 1. Whereas the highest measures at the age of 29-30 were somewhat above 0.2, the highest measures are around 0.35, at the stage when the men are ten years older. Second, there is no sign of a downward trend based on three of the four measures of parental economic status. There seems to be a slight downward trend only when parental economic status is measured by fathers' earnings, and all fathers are included irrespective of whether or not they have complete series. All measures indicate that the level of intergenerational rigidity was low for the youngest cohort, the 1963 cohort, compared to the previous cohorts. But we do not know whether this is a sign of trend that will continue into the future.



The highest measure of intergenerational rigidity in economic status is found for the measure of family earnings using only complete series. It is interesting to see that the estimates given by the different measures are so large, also at this age.

Figure 4 shows the results for the same analyses for the women. We first note that the relation between the genders with respect to the magnitude of intergenerational earnings mobility has changed as people have become ten years older. Whereas the level of intergenerational rigidity is higher among women than men at the age of 29-30, it is the other way around when they are 39-40. This most likely is the result of that the career development in people's 30's is stronger among men than among women. This again bears witness of the importance of the age when intergenerational earnings mobility is measured. As among the men there seems to be a downward trend if parental economic status is measured by fathers earnings, with all fathers included. The three other measures indicate a curvilinear trend, with decreasing rigidity among the oldest cohorts, then increasing rigidity reaching a top among the 1960 and 1961 cohorts, and then again decreasing rigidity in the two youngest cohorts.



V. Conclusion

This paper has addressed the question of the development over time in inheritance of intergenerational economic status. The analyses presented here of nearly two decades of Norwegian birth cohorts show that conclusions about both levels and trends of intergenerational mobility depend on measurement procedures. Among other things that influenced the results are the age of both the parent and the child generation, the treatment of non-valid observations of father's earnings, and whether or not the mother's earnings are included in the measure of parental economic status. All in all, the results can be used to question the conclusion in previous research that intergenerational mobility has steadily increased. This conclusion is to some extent supported if we focus only on the association between the earnings of all fathers, irrespective of the duration of measurement of their earnings, and on relatively young adult children. If we focus on the association between parental earnings, and children's own earnings around the age of forty, the results do not indicate that there has been a trend towards increasing economic mobility. The main image is rather of fluctuations in the level of intergenerational economic mobility.

Addressing the question of causes of change over time in mobility rates, Björklund and Chadwick (2003) argue that increasing divorce rates, and the fact that children more frequently live with fathers who are not their biological fathers, may contribute to a downward trend in the correlation between the earnings of fathers and children. It does seem reasonable to believe that changing family patterns do influence the extent to which children tend to inherit the economic position of their fathers. We cannot disregard the possibility that the downward trend of father's income evident in the youngest cohorts is caused by the tendency of a looser relation between fathers and children in the case of divorce. It is not possible to do a thorough study of the impact of biological and non-biological fathers here, as done by Björklund and Chadwick (2003), as the same fathers are linked to the children, irrespective of whether or not the families experience divorce.⁵ However, it is possible to study whether the impact of the fathers varies for families which at the time of the censuses in 1970 and 1980 are registered as consisting of couples with children, or mothers and children only. The measure of the impact of father's earnings is very similar for the complete families, as for all families, so increasing divorce rates does not explain the downward trend with regard to the impact of father's earnings in Figure 1 and Figure 2.

A final point is that it is interesting to note that family earnings yield lower estimates of intergenerational mobility than estimates on father's earnings only. This may bear evidence that studies of intergenerational economic mobility based on father's earnings only become more inadequate as female labour market participation rates rise.

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Notes

¹ A broader set of income measures is available from 1993, which is too recent for the parent generation in this study.

² An example of a zero observation would be if the person has no earnings, but gets economic support from public or private sources. A missing observation could be a person who immigrated in the period, or returned after spending time abroad, and for whom there are no observations for the time outside the country.

³ This means that the impact of family earnings is estimated for the same sample as for father's earnings. Problems linked or permanent and separated families are thus not addressed (cf. Björklund & Chadwick 2003).

⁴ The mean earnings of the fathers with incomplete series are also considerably lower than for those having complete series, and, and below some level of father's earnings there is no association between the earnings of fathers and sons.

⁵ The proportion missing fathers is higher for those having single mothers than for two-parent families, but in the 1970-1973 cohorts, for example, there was no information about father's earnings only for about 20 percent of those registered with single mothers in the 1980 census.