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Income mobility
Some remarks on security and incentive aspects of income mobility, illustrated by an empirical analysis for Germany

Uwe Fachinger & Ralf K. Himmelreicher

Preliminary
Abstract

The description and explanation of the income of people or households has a long tradition in economics as income and its distribution are seen as a main aspect of the wealth of nations. In this context a lot of research has been done to answer questions such as how the distribution is forming out or what the underlying process is which creates the distribution, i. e. income mobility.

The relevance of income mobility is manifold. As people are normally risk averse, they are interested in a steady income stream. This can be called the security aspect. The lower the mobility, the higher the wealth of people. Another facet of income mobility is the incentive aspect. Upward mobility provides incentives for economic activities as it is possible to be successful and move up the income ladder. Downward mobility on the other hand delivers the “sticks” for economic activities.

In most empirical analyses, the time period covered by the data is relatively short and special aspects of the life cycle theory cannot be analysed. As we can use data of workers covering their whole working life, we are able to shed some light on the income mobility over their entire employment careers. This will result in more information about the adequacy of some assumptions of the life cycle theory concerning the development of income over time – especially about the invers-U-shape assumption of income profiles.

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Corresponding address
Univ.-Prof. Dr. Uwe Fachinger
University of Vechta
Economic and Demography
Centre for Research on Ageing and Society
Driverstraße 23
49377 Vechta
uwe.fachinger@uni-vechta.de
1. Introduction

The description and explanation of the income of people, households, and families has a long tradition in economics as income and its distribution are seen as a main aspect of the wealth of nations. In this context the distribution and its changes over time are of great interest from a theoretical as well as from an empirical point of view and a lot of research has been done to answer questions such as how the distribution is forming out or what the underlying process is which creates the distribution. Younger people are joining the distribution, older people are leaving – therefore the inequality may change but the underlying process about the development of individual income is unclear. If one can answer those questions, one can also give solutions for economic policy measures concerning the income distribution and therefore the wealth of nations.

In this context the relevance of income mobility is manifold\(^1\). One assumption in economic theory is that people normally are risk averse. Therefore they are interested in a steady income stream. This can be called the security aspect of income mobility: The higher the mobility, the lower \(\text{ceteris paribus}\) the wealth of people\(^2\). The expectation of future income is relevant for planning of expenditures and savings: The less stable an income stream is, the more people are concerned with the arrangement of spending and saving money\(^3\). A lot of goods and services have to be paid permanently such as rent, contributions for insurances\(^4\) or redemption of credits. An unsteady income stream bears the risk of not being able to fulfill the expectations and therefore may hinder e.g. long term financial commitments\(^5\).

Another facet of income mobility from an economic point of view is the incentive aspect. Upward income mobility provides incentives for economic activities as it is possible to be successful and move up the income ladder as a reward, enjoying a higher social standing. Downward mobility delivers the “sticks” for economic activities as if one is not successful, he will move down in the income distribution – in the worst case getting stigmatize as a failure. Additional, income mobility is seen as an aspect which can offset the inequality of an income distribution\(^6\). It is seen as a general possibility of moving up the ladder of wealth - often called the American Dream or the Horatio Alger Myth\(^7\). In other words income mobility is considered to be an equalizer of opportunities. Mobility characterise an open society, where

\(3\) This will result in opportunity costs which are positive correlated with the extent of income mobility.
\(4\) Life insurance, health insurance, car insurance, third party insurance to name a view.
\(5\) For an example of an analysis linking income distribution and risk perception see Amiel/Cowell (2001).
\(6\) The aspect of risk with respect to income mobility is also mentioned in Burgess et al. (2000). The relationship between saving and income variability is considered e. g. in Bristol (1958).
\(7\) On the interdependencies between income inequality and income mobility see e. g. Clark (2003), De Fontenay et al. (2002), Millimet et al. (2003), Bosworth et al. (2001), Organisation for Economic Co-Operation and Development OECD (1996) or Gardiner/Hills (1999). Kopczuk et al. (2007), p. 1, point out that “… In order to understand fully the evolution of economic disparity and opportunity […], it is therefore crucial to combine the analysis of earnings inequality with the analysis of long-term mobility. …”.

Sarachek (1978), Holtz-Eakin et al. (2000).
everyone has a chance to climb the ladder of success, which is to some extent documented in the income position.

Last but not least, in a more technical view, income mobility can be regarded as just another form of redistribution – albeit a stochastic one.

Regarding the empirical analysis, in most analyses, the time period covered by the data is relatively short. Therefore special aspects of the life cycle theory could not be analysed. As we can use data of workers covering their whole working life, we are able to shed some light on the income mobility over their entire employment careers. This will result in more information about the adequacy of some assumptions of the life cycle theory concerning the development of income over time – especially about the invers-U-shape assumption of income profiles and the underlying mobility pattern.

Furthermore, we will fill some gap in the knowledge as in Germany, income mobility is mainly neglected in the area of distributional and social policy analysis. Virtually nothing is known for example about earnings mobility and its impact on earnings inequality. Has earnings mobility increased along with earnings dispersion? Is it now easier than before the transition to move up the earnings ladder? Has earnings mobility offset the increase in earnings inequality? Which worker groups are likely to see their earnings status to improve, and which to worsen?

The paper is structured as follows. First a short overview is given of some relevant theoretical aspects, which has to be taken into account when analysing income mobility. What follows is a survey of the analysis done for Germany. The results presented will yield as background information for our analysis. It is shown that most of the analysis is descriptive just giving information about the changes of income over time without trying to construct or test an explanatory model. However, due to the restricted socio-economic information in our data base, we are also unable to test explanatory models, as can be seen in chapter 4 in which the data and the method are briefly explained. Though, as the time span covered by our data is large, we get information about the relevance of age-, period- and cohort-effects for explaining income mobility.

2. Some theoretical remarks

At first, it is to be stated that in all empirical and theoretical analyses income mobility is defined as the change in income from one period to another for the same research unit, e.g. individuals, households, or families – considering sometimes also the intergenerational dimension. However, using families or households as research units is problematic as such

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8 See for example Ayala/Sastre (2008a), Organisation for Economic Co-Operation and Development OECD (1996), Bigard et al. (1998) or Van Kerm (2006) for research on the differences in income mobility with respect to the comparison as one aspect of the welfare of countries.

9 See for such an approach Benabou/Ok (1998) and Benabou/Ok (2001b), p. 2.

10 Quellen angeben ●●●

11 Only some rather general information is given in e. g. Bundesregierung (2001), pp. 41, Bundesregierung (2005), pp. 48, Bundesregierung (2009), p. 41.

12 See e. g. Solon (1992). For an analysis of intergenerational mobility on mother or father – daughter or son pairs see Österberg (2000).

13 Households could be defined e. g. to be one person living alone, or a group of persons who either share living accommodation or one meal a day, and who have the address as their only or main residence Burgess et al. (2000), p. 17. However, in some analysis the terms household and family are used equally; see for example Chen (2009), pp. 77 f., Dickens/McKnight (2008b) or Pendakur (1998).
a unit is not stable over time\textsuperscript{14} even if one uses equivalence scales to take changes in the household composition into consideration. Nevertheless for comparing the income mobility between countries, it is necessary to take the different household compositions into account\textsuperscript{15}.

Independent of the income definition and the research unit, six theoretical concepts of mobility are discussed and analysed in the literature\textsuperscript{16}:

1. time dependence, the focus of this concept is the degree to which income in one period is determined by the income in the previous period(s);
2. positional movement, using this concept one is interested in changes in economic positions in the income distribution (using classifications like ranks, deciles, or quintiles);
3. share movement, this concept focuses on the change of the recipient’s shares of total income in the population;
4. income instability\textsuperscript{17}, which analyse the size of changes in income levels but not their sign;
5. directional income movement, which measures how many recipients move up or down the income distribution and by how much; and
6. mobility as an equalizer of longer-term income, which compares the inequality of income at a point in time with the inequality of income over a longer time period.

All those concepts are used in analyses with different definitions of income\textsuperscript{18} and different research units. Therefore, even that a lot of research was done on the methods of measurement of income or earnings mobility\textsuperscript{19}, the problem still exists that, “the income mobility literature is still distressingly far from being unified on how to measure mobility and make mobility comparisons”\textsuperscript{20}.

In the international literature, most economic mobility studies work with transition matrices\textsuperscript{21}. Typically, the rows and columns of such matrices are quantiles (such as quintiles or deciles) of the base year and final year income distributions.

A rather unconventional analysis is the case study of Hills et al. (2006) with 93 families as they are analysing income variations within a year (weekly income records) for family income. Income diaries were used to collect the data and to support the primary data collection method which was a fortnightly Computer-Assisted Telephone Interview.

\textsuperscript{14}See inter alia Duncan/Hill (1985). Therefore analysis on the household level indicate more income mobility than on the individual level, see e.g. Burgess et al. (2000), p. 5.


\textsuperscript{17}Sometimes called flux Dragoset/Fields (2007), pp. 12.

\textsuperscript{18}Covering the whole spectrum from household income to earnings from a specific kind of work.

\textsuperscript{19}See for an overview Ayala/Sastre (2008a).

\textsuperscript{20}Fields/Ok (1999), p. 586.

\textsuperscript{21}Atkinson et al. (1992); Buchinsky/Hunt (1999), Fields (2001).
Most of the discussion is not about the mobility and its explanatory variables / determinants but on the adequate method of measurement. In the literature new axiomatic contents and analytical properties equal to those existing in the case of the static analysis of the income distribution has been discussed, which are the foundation of new methods and techniques for the measurement of income mobility that has been developed. For example, there are some axiomatic lines of research establishing the basic assumptions that mobility indices should satisfy when analysing the movement of incomes over time. Also the measurement of income mobility from a welfare point of view is intensively examined in the literature. Such approaches generally relate income mobility with the equality of opportunity and the removal of social barriers.

A different approach is the Markovian model of mobility. This model utilizes stochastic processes for modelling the time path of income. The last approach sees income mobility as the transitory component of income development over time – with no “explanatory power”. This would mean that mobility is residual and can not be explained. But this is unsatisfying as the changes in the income position over time need to be explained.

Therefore the questions remain: how to explain mobility respectively what are the determinants of income mobility? A natural starting point would be the life cycle theory. The main goal of this theory is the explanation of the development of individual income over time. But this includes implicitly also the consideration of some of the six concepts, mentioned above, and therefore the explanation of some aspects of income mobility.

However, in life cycle theory income mobility is not explicitly addressed. It is rather seen as a residual factor or the transitory component contrary to the permanent income. Permanent income can be viewed as a function of human and non-human capital of individuals (or households conditioned by its composition) which controls for position in the life cycle. This can be illustrated by a simple formulation such as:

$$Y_t = \alpha_t \cdot D_t + \beta_t \cdot E_t + \gamma_t \cdot A_t + \delta_t \cdot C_t + \varepsilon_t$$

Where permanent income $Y$ in time period $t$ is seen to depend on
- household composition $D$,
- the educational and occupational status $E$,
- stock of physical assets $A$ – it is assumed, that $A$ will peak after around 2/3 of working life; using a quadratic term to deal with this assumption leads to an invers-U-shape profile –, and
- community or environmental characteristics $C$ such as access to amenities.

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22 See for an example of analysis using explanatory variables for income mobility Bandyopadhyay/Cowell (2006) with respect to different risk factors or Fachinger (1991), Contini et al. (2007) for approaches to identify some determinants. Chen (2009) analyses the impact of government income (pp. 89-92) and of demographic factors (pp. 92 f.)


25 See for an analysis with panel data on transitory and permanent components e. g. Ramos (2003).


27 See for a discussion Fachinger (1994).
Therefore $\varepsilon$ is the catch-all variable for all other aspects not included in the explanatory variables D, E, A, and C. Changes in income are due to external shocks like illness, unemployment, retirement, economic shocks influencing the income out of savings (like the ongoing financial crisis), changes in the service of communities etc. For individuals those shocks are not predictable and the individuals are helpless in face of such factors like a small boat on a stormy sea.

Entering the labour force a lot of the above mentioned variables are deterministic, like age, gender, or education. The question is what are the relevant determinants to explain income changes? It should be clear, that the income from at least the previous period must be taken into account as, given equation 1, income mobility can bee seen as the differences in income between to points in time.

$$\Delta Y = Y_{it} - Y_{it-1} + \varepsilon$$  \hspace{1cm} (2)

Let $X$ be a vector which includes the “explanatory” variables (e.g. $X$ includes dummies for gender, race, age, and education) and using lagged income variable $Y_{it-1}$ result in

$$\Delta Y = \rho \cdot X + \delta \cdot Y_{it-1} + \varepsilon$$  \hspace{1cm} (3)

Taken into account the kind of determinants in the four groups, this is acknowledged e.g. by Dragoset / Fields (2007), who “… do not interpret this as a causal model of earnings changes, but rather a way of answering the question of which individuals experience the most positive earnings changes, holding other things equal. …”\(^{28}\).

Using such equation for the description of the income development over time, results in an invers-U-shaped profile for the (working) life cycle of individuals as shown in Figure 1.

\(^{28}\) Dragoset/Fields (2007), p. 15. However, e.g. Smith (1994) identifies some factors which “explain” income mobility.
The profiles in Figure 1 indicate a special pattern of mobility but the figure is open to at least two interpretations. Firstly, the profile can be seen as the development of real individual income over time, representing the productivity of the worker. Since the marginal productivity decreases over the whole career and employees are paid due to their productivity, the income profile follows this pattern. Therefore, from its own point of view the individual experience a rise in real income – upward mobility – and after about 2/3 of working life a decline in real income – downward mobility. Explaining this process would therefore be identical to explaining income mobility.

Secondly, the development of real income may also lead to changes in the income position. Entering the labour market the individual may start to climb up the income ladder over the time as she or he is physically well equipped and has the newest knowledge about technology etc. The amount of human capital will therefore lead to a higher productivity than the older employees, resulting in a steeper profile and to a higher productivity. The profile has a decreasing marginal rate of return as the human capital / earnings capability will diminish. The wear and tear lead to a drop down in physical skills as well as the intellectual assets will get older.

This means that we notice an upward mobility in the income distribution during the first part of working life and a downward mobility afterwards. In other words, by analysing mobility, someone has to look at the entire picture as short-term analyses can not identify the long-term development – even if in some years downward mobility dominates, it is necessary to take the development over a longer period of time into consideration.

Source: Own diagram.

29 See for example Skirbekk (2008).
This concept of income mobility is a little bit trickier to explain as it has to take the income distribution into account. It is not covered by the income function as one can experience upward mobility due to a rise in real income and at the same time, her or his relative position within the distribution may decrease.

The first kind of income mobility measuring concept is called non-positional income mobility because the changes of the absolute real or nominal income over time are considered. If the relative position and its changes in the distribution are considered, this kind of mobility is called positional mobility.

With that in mind, the invers-U-shape of an income profile in cross sectional analysis can be interpreted as a description of the development of an individual position in the income distribution over time. However, there exist strong indications that it is not an individual profile.

At least one more problem arises in measuring and / or explaining income mobility. One has to take into account the composition of income. As a rule, income of people or individuals comprises different components enclosing earned and unearned income. Each component should be analysed separately because the factors, which could be explaining the mobility of income are not the same. The determinants of wages are different (productivity, labour unions etc.) than the determinants of income from capital (economic success of investment company etc.). However, the direct and indirect effect of an income source on income mobility depends on its own mobility.

Therefore, we take a closer look at the development of a special kind of wages out of one resource – earning which is subject to social insurance contributions. Such data has also some advantages compared with survey data. On a more technical note, especially in analysing mobility on the basis of survey data you have to deal with measurement errors – are the deviations for real or the result of the data collection process? In an attempt to work with an error-free measure of earnings a much smaller literature uses only administrative-based data to study mobility. Using such data is also advantageous as no problem with sample attrition exist.

3. State of the Art

Nowadays we know a lot more about the distribution of income and earnings – but we don’t know the underlying processes which generate such distribution and until now, only little
research has been done to try to explain it. Research was almost done on describing income mobility – i.e. markov process or transition matrices are measures to describe the process, not to explain it. Analysis was mostly undertaken empirically to identify the underlying process which shape the income distribution. Furthermore, despite the extensive empirical literature about income mobility in general, little is known about the long term mobility as “… studies of mobility have focused primarily on short term mobility measures due to lack of long and large longitudinal data. …” 36. Therefore we know a lot about the process itself – how income mobility has develop over time for particular countries esp. the U. S.– but we know a lot less about the reasons, why this has happened37.

Contrary to the overall situation, only little research has been done on income mobility in Germany – and those empirical works differ especially in method and covered time period as can be seen in Table 1. For Germany, just two data bases were used to analyse income mobility: The German Socio-economic Panel (GSOEP)38 and social security earnings records from the Statutory Pension Insurance (FDZ-RV)39. Most analyses were done using the GSOEP – albeit with different population and statistical unit, which makes the results hardly comparable in detail – and so far, only three analyses covering a large time period were done by using data records from the FDZ-RV40.

Table 1: Data sources and methods used in income mobility analyses in Germany

<table>
<thead>
<tr>
<th>References</th>
<th>Source</th>
<th>Population and statistical unit</th>
<th>Period</th>
<th>method</th>
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<tr>
<td>Schäfer (1981)</td>
<td>Various surveys</td>
<td>Special groups of workers</td>
<td>1886 to 1906; Cross section from 1900, 1905, 1910</td>
<td>Non positional mobility and hypothetical profiles based on cross section data</td>
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<tr>
<td>Schmähl / Fachinger</td>
<td>Social security earnings records</td>
<td>Gross individual earnings</td>
<td>1961 to 1970</td>
<td>transition matrices, deciles</td>
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<td>Fachinger (1991)</td>
<td>Social security earnings records</td>
<td>Gross individual earnings</td>
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<tr>
<td>Rendtel / Schwarze</td>
<td>GSOEP</td>
<td></td>
<td>1984 to 1989</td>
<td>transition matrices, deciles</td>
</tr>
<tr>
<td>Rohwer (1991)</td>
<td>GSOEP</td>
<td></td>
<td>1984 to 1989</td>
<td>transition matrices</td>
</tr>
<tr>
<td>Berntsen (1992)</td>
<td>GSOEP</td>
<td></td>
<td>1984 to 1989</td>
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<td>Rendtel et al. (1993)</td>
<td>GSOEP</td>
<td>equivalised41 household income</td>
<td>1984 to 1986</td>
<td>transition matrices, two states above and below the poverty threshold transition matrices,</td>
</tr>
<tr>
<td>Fachinger (1994)*</td>
<td>Social security</td>
<td>Gross individual</td>
<td>1950 to 1979</td>
<td></td>
</tr>
</tbody>
</table>

37 The empirical literature on income and earnings mobility in various countries around the world is voluminous; see Atkinson et al. (1992), Baulch/Hoddinott (2000), and Dragoset/Fields (2007) for surveys. An overview of empirical research in Latin America is given by Fields et al. (2006).
38 For a description of the data see e.g. Wagner et al. (2007).
40 But this situation may change as such data are now provided by the Research Data Centre (FDZ) of the German Pension Insurance (FDZ-RV) (http://forschung.deutsche-rentenversicherung.de/ForschPortalWeb/contentAction.do?key=main_fdz_english) and of the Federal Employment Agency at the Institute for Employment Research (http://fdz.iab.de/en.aspx).
41 The equivalence scale used in this analysis was in accordance with German legislation for social aid: head of household 1.0, member of household older than 18 years 0.8, household members aged between 15 and 18 years 0.9, for household members 0.65 which are aged between 8 and 14 and for those younger than 7 years 0.55.
<table>
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<th>Data Source</th>
<th>Methodology</th>
<th>Time Period</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Schluter (1997)</td>
<td>GSOEP</td>
<td>earnings records</td>
<td>1984 to 1989</td>
<td>deciles transition matrices with four groups with respect to the median*** transition matrices</td>
</tr>
<tr>
<td>Müller / Frick (1997)</td>
<td>GSOEP</td>
<td>equivalised 42 household income</td>
<td>1990 to 1994</td>
<td>Mobility indices and transitions matrices</td>
</tr>
<tr>
<td>Merz / Kirsten (1998)</td>
<td>GSOEP</td>
<td>equivalised 44 post-tax post-benefit household income</td>
<td>1985 to 1994</td>
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</tr>
<tr>
<td>Schluter (1998)</td>
<td>GSOEP</td>
<td>gross individual labour income, gross and net equivalent 46 labour income of households gross and net equivalised 47 household income</td>
<td>1984 to 1993</td>
<td>Shorrocks and Prais mobility indices</td>
</tr>
<tr>
<td>Hauser / Fabig (1999)</td>
<td>GSOEP</td>
<td>gross individual labour income, gross and net equivalent 46 labour income of households gross and net equivalised 47 household income</td>
<td>1990 to 1995</td>
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<tr>
<td>Fabig (1999a) / Fabig (1999b)</td>
<td>GSOEP</td>
<td>Person’s post-tax post-transfer annual income</td>
<td>1990 to 1994</td>
<td>Bartholomew-Index and transition matrices with seven classes</td>
</tr>
<tr>
<td>Jenkins / Van Kerm (2003)</td>
<td>GSOEP</td>
<td>Person’s post-tax post-transfer annual income</td>
<td>1984 to 1997</td>
<td>Mobility indices</td>
</tr>
<tr>
<td>Van Kerm (2003)</td>
<td>GSOEP</td>
<td>Person’s post-tax post-transfer annual income</td>
<td>1984 to 1997</td>
<td>Mobility indices</td>
</tr>
<tr>
<td>Behr et al. (2003)</td>
<td>ECHP**</td>
<td>Household income</td>
<td>1977 to 1998</td>
<td>Shorrocks index and transition matrices, quintiles</td>
</tr>
<tr>
<td>Hauser et al. (2007)</td>
<td>GSOEP</td>
<td>Real disposable equivalised 50 household income</td>
<td>2000 to 2006</td>
<td>Transition matrices</td>
</tr>
<tr>
<td>Ayala / Sastre (2008b)</td>
<td>ECHP</td>
<td>Real disposable equivalised 50 household income</td>
<td>1993 to 1997</td>
<td>Fields and Ok mobility index, Chakravarty–Dutta–Weymark</td>
</tr>
</tbody>
</table>

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42 “New” OECD equivalent scale: Income divided by household size raised to power 0.5.
43 The equivalence scale used in this analysis was in accordance with German legislation for social aid: head of household 1.0, member of household older than 18 years 0.8, household members aged between 15 and 18 years 0.9, for household members 0.65 which are aged between 8 and 14 and for those younger than 7 years 0.55.
44 Different equivalent scales.
45 OECD equivalent scale: Income divided by household size raised to power 0.5.
46 „Old“ OECD equivalent scale: head of household 1.0, member of household older than 14 years 0.7 and household members 14 and younger 0.5.
47 „Old“ OECD equivalent scale: head of household 1.0, member of household older than 14 years 0.7 and household members 14 and younger 0.5.
48 Equivalence scale is approximated by the square root of the household size.
49 Equivalence scale is approximated by the square root of the household size.
As can be seen from the list, in principle information about income mobility in Germany is available. Unfortunately the results are not directly comparable as those analyses are using the same data base but not the same methods and not even the same income concept. However, overall one can state that a lot of income mobility was detected. But all those analyses on the basis of the GSOEP cover only a short period of time. Only the analyses done by Fachinger and Brenner (2009) took the whole working biography into account.

The GSOEP was also used in the reports of poverty and riches of the Federal Government of Germany. The reports illustrate the view of the Federal Government on the relevance of income mobility in economic and social policy as mobility is mainly discussed in connection with poverty risk and not as an overall phenomenon to describe the aforementioned aspects of welfare in respect to income mobility.

Hence from a political point of view it is unknown what has to be done to reduce or to foster income mobility. The political focus lies on attempts to reduce income poverty or social exclusion, in other words to rise upward mobility for the poor and to reduce downward mobility for those who have a high poverty risk. Therefore, “explaining” mobility concentrates on trying to find determinants which could be used to develop measures reducing or avoiding social exclusion.

Concerning income mobility, for Germany only one analysis was done to identify and analyse its determinants using hazard rate models. However, even our knowledge about the process of mobility itself is limited. Will there be less mobility in later working life when the positioning in the income distribution has finally taken place as the following figure indicates? How much persistence exists? We do not know whether the income position remains the same as it is indicated by the profile of average income after a period which ends with the positioning into the distribution.
4. Method and Data

As previously discussed, at least three aspects has to be taken into account in analysing income mobility,

1. the definition of income,
2. the definition of the research unit, and
3. the setting of the concept of mobility analysis.

The income which underlying the analysis is set by the used data material\(^{56}\): gross monthly labour earnings which are due for social security contributions. This also constitutes the research unit: the individual who is registered in the state pension insurance records.

In the following, we will consider the income of the same individuals at two or more points of time.

4.1. Method

As discussed earlier there are several alternatives to define mobility and the approaches used in previous analyses for Germany are quite different, as is shown in Table 1. We will use the concept of positional mobility and apply transition matrices – the change from one relative income class to another – with twenty classes.

This approach bears some problems which have to be taken into account when interpreting the results. For example a change in income from the lower class limit to the upper class limit of the next one (case A) is exactly judged the same as a change from the upper limit of the class \(Q_1\) to the lower limit of next higher class \(Q_2\) as shown in Figure 2.

**Figure 2: Diagram of „jumping distance“**

Source: Own diagram.

Another problem comes from the instability of the class limits. If class limits change over time and the income remain the same, a change of classes could happen – and therefore it would be interpreted as positional mobility even that an individual does not experience a change in income at all. Because transition matrices are based on ranks in the income distribution, they can only present a picture of changes of position within the income distribution and cannot say anything about the changes in dollars or other currency units, either within or across classes. This clarifies the differences between positional and non-positional income mobility\(^{57}\).

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\(^{56}\) See for a detailed description Himmelreicher/Stegmann (2008).

\(^{57}\) Positional and non-positional income mobility is analysed e. g. by Contini et al. (2007), p.17 ff.
4.2. **Data**

Longitudinal micro-data of the German Federal Pension Insurance are used which contains biographical and pension information on people which retired in the same year\(^58\). Therefore such data are inflow samples which include only retirees. The sample covered a time span from the first year of contribution payment to the German Federal Pension Insurance until the retirement year. Hence the maximum time span covers 52 years, starting in the year the person turned 17 up to the year the person turned 65.

Two different samples are used for our analysis. The first inflow-sample is from the year 1981 and the second from year 2005. In all, the data cover the time span from 1947 up to 2005. Therefore, period effects such as the oil crisis have to be taken into account while interpreting the results\(^59\).

For the analysis of income mobility the information about the individual earning points is used. Earnings points are calculated as follows: the individual gross monthly labour earnings which are due for social security contributions are divided by gross earnings per average employee\(^60\). Therefore earnings points are dimension free as the division annuls the influence of all factors with the same effect on denominator and nominator\(^61\) – as the real economic activity – and deflation is unnecessary.

5. **Empirical Analysis**

5.1. **Income profiles**

Arguing along the line of concept 2, the so called positional mobility, and looking at the profiles in the following figures the following hypotheses could be assumed. After entering the labour market

- for women, income mobility stays the same over the whole working life as no major upward or downward development can be identified in the income profiles.
- for men over a time span of about ten years upward income mobility will determine the income changes, but contrary to the profiles in Figure 1, in the phase after positioning in the distribution between ages 35 to 40, only minor mobility within the distribution will take place on average.

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\(^{58}\) Unfortunately the data set contains only few explanatory variables – it does not include any information about the household context of the individuals and not even about other income. See for a more detailed description Himmelreicher/Stegmann (2008) and Fachinger/Himmelreicher (im Erscheinen).

\(^{59}\) Unfortunately period effects from the individual life cycle such as partnership formation or having children could not be considered with our data; see for the relevance of such effects e.g. Rigg/Selton (2004).

\(^{60}\) § 70 Book VI of the German Social Welfare Code (SGB VI) and Annex 1 Book V of the German Social Welfare Code (SGB V).

\(^{61}\) See e.g. Fachinger (1994), pp. 85, with numerous references.
Figure 3: Income profiles of women over age


Figure 4: Income profiles of women over age

Figure 5: Income profiles of men


Figure 6: Income profiles of men over age

5.2. Mobility

5.2.1. Overall mobility

Analysing the overall mobility gives some hints about the security of an income position and the chance of moving up or the risk of moving down within the income distribution. As the average individual income profiles are quite stable over the most part of working life, is the same true for income mobility?

Income mobility can be interpreted in the sense of “openness” of the distribution or flexibility of income position. In Figure 7 the development of the percentage of mobility – i.e. percentage of people, which are not in the same income class in the next year – is shown.

Figure 7: Income mobility of women over time

More than sixty percent of women have experienced changes in their income position during the time from 1947 to the early 1970s, whereas more than thirty percent over the last twenty years changes their income situation within the distribution, i.e. one third of the female cohort members had unstable positions.

Overall, the development of income mobility of the analysed cohorts seems to be quite steady. The profiles show a decline of overall mobility until the early 1980s which corresponds to the economic development as after World War II the economy was prospering – especially in the 1960s. This came to an end culminating in the first oil price shock. During the 1970s the economy was full established – integrated into the world economy and therefore more depending on the international economic development. Since the early 1980s Germany had a full grown economy without any special circumstances. The decline of income mobility could also be interpreted as a sign of sclerotisation in the sense of Olson62.


62 Olson (1982).
It seems as if period effects are influencing the income mobility as some up and downs in the profiles occur in the same year. For example, the effect of the breakdown of the GDR and the joining of the five newly-formed German states (1989 to 1992)

However, if one analyses the income development and mobility over time, period-, age- and cohort-effects have to be taken into account. To get an idea, whether age effects are relevant, in Figure 8 the data are printed against the calendrical age. In Figure 8 a more or less steady decline of income mobility for the older cohorts can be identified whereas for the two younger cohorts the mobility level remains more or less the same. A distinct age-effect for women can not be identified in the mobility profiles.

**Figure 8: Income mobility of women over age**

![Income mobility profile for women](image)


Unlike the profiles for women, the income mobility profiles of men show extremely large and unstructured variations over time for the two younger cohorts.
How much of mobility is upward mobility and how much is downward mobility? If someone takes the theoretical income profile of Figure 1 serious, at the beginning of one’s career, the mobility should overall upward.

### 5.2.2. Upward mobility

To get an impression about the possibility of improving its own income situation and whether the distribution is open for successful people, in Figure 10 the profile of upward mobility is shown.
The overall structure of the upward mobility in Figure 10 looks like the structure of the mobility in Figure 7 – just on a lower level and without the drastic reduction over the 1970s. The upward mobility is around thirty percent until the mid 1970s and roughly twenty percent afterwards. Noteworthy is the time period between 1989 and 1995: The mobility during those years seems to consist mostly of income position improvement. This is an indication that period effects may influence the amount and direction of income mobility.

Regarding age-effects one would suggest that there would be a special “time path” as shown in Figure 1. At the beginning of ones career the upward mobility should be quite high but declining with work experience. However, the development of income mobility for women does not correspond very well with the profile in Figure 1. In Figure 11 the age profiles are represented. As can be seen, no indications of age effects are observable.
Figure 11: Upward income mobility of women over age


Figure 12: Upward income mobility of men

5.2.3. Downward mobility

From a theoretical point of view, the development of downward mobility should be contrary to the upward mobility. That means that at the beginning of one’s working life, downward mobility should be rather low and at the end it should be expected as rather high. However, just as for upward mobility, there is not such a development over time as can be seen in the following figures.

Figure 14: Downward mobility of women
Figure 15: Downward income mobility of women over age


Figure 16: Downward mobility of men

The amount of downward mobility and its development over time is comparable to the upward mobility. A specific structure, i.e. reflecting age-, cohort- or period-effects, can not be identified. It seems as if there is just a percentage of people – between twenty and thirty percent per year – “moving down” the income distribution.

6. Summary

The amount of mobility is surprisingly high: over fifty percent of the people are not staying in the same income class. For income from regular dependent employment without phases of unemployment, reduction of working time, and during a time of full employment (with mainly frictional unemployment) one would have thought that the component of permanent income would be higher – especially considering risk averse behaviour.

However, there is not such a general objective “optimal” degree regarding the “correct” amount of mobility – when is it too high and when will it be too low?

Our analysis shows that the development of individual profiles and income mobility does not correspond very well to assumptions of the human capital theory / life cycle theory with dominating upward mobility in the first ten or twenty years of the working life and dominating downward mobility afterwards.

“Transitory” income elements seem to be quite high\(^{63}\). This is relatively remarkable as just one income source is analysed: the individual gross monthly labour earnings which are due for social security contributions. Income components such as interest earnings or self-employment income which are mainly seen as unsteady over time are not considered.

\(^{63}\) A high degree of income mobility is also a result of the analysis of Cantó (2000) for Spain and Joseph Rowntree Foundation (1997) for Britain.
This is not a “good” result as the higher the transitory component, the lower the explanation power of theoretical models as transitory components are beyond economic explanation. Therefore the dominance of the transitory component restricts the analysis merely to a description of the income distribution and its development over time.

What determines the income mobility is still an open question, which could not be answered with our data. However, there are some indications for macro-economic effects. Individual income mobility seems to be higher during times of economic instability.

With our data it was possible to cover a large time period – much larger than any other analysis has covered up to date – with different overall economic development, and to distinguish between age-, period- and cohort-effects.

7. Literature


Brenner, Jan (2009): Life-Cycle Variations in the Association between Current and Lifetime Earnings – Evidence for German Natives and Guest Workers. Ruhr Economic Papers 95, Bochum, Dortmund, Duisburg, Essen: Ruhr-Universität Bochum (RUB), Department of Economics, Technische Universität Dortmund, Department of Economic and Social Sciences, Universität Duisburg-Essen, Department of Economics, Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI).


Merz, Joachim / Kirsten, Dagmar (1998): Extended Income Inequality and Poverty Dynamics of Labour Market and Household Activities A Ten Years Microanalysis with the German Socio-Economic Panel. FFB Discussion Paper 25, Lüneburg: University of Lüneburg, Department of Economic and Social Sciences, Research Institute on Professions (FFB).


