IHS Economics Series
Working Paper 108
October 2001

Wage Mobility in Austria 1986-1996

Helmut Hofer
Andrea Weber

Institut für Höhere Studien
Institute for Advanced Studies
Vienna

108
Reihe Ökonomie
Economics Series

Wage Mobility in Austria 1986–1996

Helmut Hofer, Andrea Weber

108

Reihe Ökonomie

Economics Series

Wage Mobility in Austria 1986–1996

Helmut Hofer, Andrea Weber

October 2001

Institut für Höhere Studien (IHS), Wien
Institute for Advanced Studies, Vienna

Contact:

Helmut Hofer
☎: +43/1/599 91-251
email: hofer@ihs.ac.at

Andrea Weber
☎: +43/1/599 91-147
email: webera@ihs.ac.at

Founded in 1963 by two prominent Austrians living in exile – the sociologist Paul F. Lazarsfeld and the economist Oskar Morgenstern – with the financial support from the Ford Foundation, the Austrian Federal Ministry of Education and the City of Vienna, the Institute for Advanced Studies (IHS) is the first institution for postgraduate education and research in economics and the social sciences in Austria. The **Economics Series** presents research done at the Department of Economics and Finance and aims to share "work in progress" in a timely way before formal publication. As usual, authors bear full responsibility for the content of their contributions.

Das Institut für Höhere Studien (IHS) wurde im Jahr 1963 von zwei prominenten Exilösterreichern – dem Soziologen Paul F. Lazarsfeld und dem Ökonomen Oskar Morgenstern – mit Hilfe der Ford-Stiftung, des Österreichischen Bundesministeriums für Unterricht und der Stadt Wien gegründet und ist somit die erste nachuniversitäre Lehr- und Forschungsstätte für die Sozial- und Wirtschafts-wissenschaften in Österreich. Die **Reihe Ökonomie** bietet Einblick in die Forschungsarbeit der Abteilung für Ökonomie und Finanzwirtschaft und verfolgt das Ziel, abteilungsinterne Diskussionsbeiträge einer breiteren fachinternen Öffentlichkeit zugänglich zu machen. Die inhaltliche Verantwortung für die veröffentlichten Beiträge liegt bei den Autoren und Autorinnen.

Abstract

We examine wage mobility of Austrians, using 1986-1996 data from administrative sources. For the evaluation of wage mobility we calculate mobility measures based on transitions between quintiles in the wage distribution. A second group of indices measure wage mobility by the extent to which averaging wages over a longer period decreases cross sectional inequality. We find that mobility reduces wage inequality by 7 per cent over a six-year period. This equalising effect of wage mobility is only half as large as in other OECD countries. Considering an 11 year horizon for Austria implies a reduction of inequality of 10 per cent. Mobility is high only for young workers and for workers who changed their employer at least once during the observation period. Decomposing the sample into sex, age and worker-type groups and comparing within- and between-group mobility shows that most of the equalising effect of mobility occurs within the groups.

Keywords

Wage mobility, Shorrock's indices, Corporatism

JEL Classifications

J6, J31, P52

Comments
We thank Peter Mitter for valuable comments and Christine Lietz for excellent support with data processing. We have benefited from comments of participants of the EALE 2001 conference and seminar participants at the Austrian Institute of Economic Research. Financial support from the Jubiläumsfonds of the Austrian National Bank, grant no. 7952 is acknowledged.

Contents

1 Introduction

In the 1980s and early 1990s earnings inequality rose in several OECD countries, particularly in the USA and UK (Levy and Murnane, 1992; Machin, 1998). This discovery has generated much research about the extent, causes and consequences of inequality. One important question is whether individual wage mobility can at least partly offset the increase in cross-sectional inequality (Atkinson et al., 1992; Buchinsky and Hunt, 1999; Dickens, 2000). Otherwise it would have to be associated with a rising inequality of lifetime earnings. A second issue is whether mobility contributes to the adjustment of macroeconomic shocks. The evidence concerning the development of wage inequality for several OECD countries is mixed. However, the degree of wage mobility is relatively uniform across countries (Aaberge et al., 1996; OECD, 1996, 1997).

We analyse the degree of wage mobility for Austria by presenting measures of wage mobility for the period 1986 to 1996. We use administrative data from the social security records. These data give the most accurate wage information on individual basis that is available. Moreover, there is a low sample attrition rate compared to panel data sets collected on an interview basis.However wages are top coded due to the contribution assessment ceiling of the social security system, which affects some mobility measures.

National labour market institutions play an essential role for the determination of labour market outcomes. In continental Europe most workers have their wages set as a result of collective agreements negotiated between trade unions and employers. According to the Calmfors and Driffill (1988) hypothesis there is a hump shaped relationship between the degree of centralisation of wage setting and the rate of unemployment. Countries with economy-wide coordination as well as countries with the lowest degree of coordination should show the most favourable outcomes.

There is consensus that Austria represents the quintessence of a corporatist economy and for this reason labour market outcomes in Austria are considered by several authors (Fuess and Millea, 2001; Pekkarinen et al., 1992; Teulings

and Hartog, 1998). Many observers, for example the OECD, have pointed to the high aggregate real wage flexibility in Austria as a major reason for the favourable labour market performance. On the other hand, Hofer et al. (2001) find that relative wage structures, e.g. industry wage differentials and the returns to education and experience, appear to be rather rigid in Austria. An explanation for these findings might be that the pronounced flexibility on the macro level reduces the demand for micro flexibility (Teulings and Hartog, 1998). As a consequence of reduced micro flexibility we might expect to find low levels of wage mobility in Austria.

Evidence about the Austrian level and development of wage inequality is relatively scarce and to our knowledge no studies about wage mobility exist. Beblo and Knaus (2000) report that within the Euro-area income is most equally distributed in Austria, France, Germany and Netherlands. Income inequality slightly increased between the mid-1980's and mid-1990's, somewhat more among the working-age than the retirement-age population (Förster, 2000). Gusenleitner et al. (1998), using data for 1972 to 1991 find that the wage distribution in Austria narrowed from 1971-80, but widened from 1980-91. Decomposition of the overall trend into sex and skill categories shows that within-group changes explain most of the developments.

Our results show that according to all applied measures the degree of wage mobility is low in Austria. In comparison to other OECD countries robust indices, based on quintile transitions of men, place Austria next to France and Germany at the bottom of the country ranking. The equalising effect of wage mobility is about half as large as in other OECD countries. Inequality measured by the mean log deviation index is reduced only by 10 per cent when averaging over 11 years. Further, we find a high mobility only for young workers and for workers who changed their employer at least once during the observation period. In Austria women are a highly immobile group although their wages are concentrated at the bottom of the distribution. Decomposing the sample into sex, age and worker-type groups and comparing within- and between-group mobility shows that most of the equalising effect of mobility occurs within the

groups.

In the following section we describe the data set. Section 3 provides an overview of selected inequality and mobility measures. Section 4 presents results from the analysis of the degree of wage mobility in Austria. We relate our results to comparative studies by the OECD (1996, 1997) for the period 1986-1991. Further we extend the empirical analysis for Austria to the period 1986-1996. At the end of the section we conduct some sensitivity analysis to evaluate the effect of top coding on the mobility measures. The final section summarises and concludes.

2 Data description

We use a random sample drawn from the social security records in Austria. Our sample contains data on the social status of the individuals for every day covering the years 1986 to 1996. The social security authority collects detailed information for all workers in Austria, except for self-employed, civil servants and marginal workers. There are major advantages of using such administrative data compared to the analyses based on surveys. First, there is no outflow apart from death and migration and inflow is random. Hence sample attrition, which is often considerable in longitudinal surveys, is not an issue in administrative data[1]. Another advantage is that one gets a highly reliable measurement of income of individuals, because the recall of individuals regarding their incomes is very unlikely to be better than the information from the social security authority. A final advantage is that administrative datasets are often very large. Our total sample contains 72,933 persons, who have been in the labour force at least for one day between 1986 and 1996. We use only individuals for whom nonzero earnings are available and who were employed for at least 180 days per year. For the period 1986 to 1996 (1986 to 1991) our sample size is 14,912

[1] However, self-selection due to economic reasons might still affect empirical results. Individuals may endogenously on wages terminate employment, become self employed, unemployed or withdraw from the labour force.

(21,942) workers.

As the data are collected for social security reasons there are several shortcomings for empirical analyses. Earnings data are top coded because of the contribution assessment ceiling in the social security system. The sample we use for the analyses contains at most 15% censored wage observation per year. Further, the number of observable worker characteristics is rather scarce, we have no information on schooling, working time and family affiliation. Because of the lack of information on working time, we cannot calculate wage rates. In our analyses wage mobility is examined in terms of monthly earnings. These are calculated as annual earnings divided by months of work.

As we compare our empirical results on wage mobility in Austria with results for other countries in studies by the OECD (1996, 1997), we put huge effort in obtaining a sample which is consistent with the OECD data sources. The OECD used data sets based on both administrative sources and surveys (household or establishment based). The earnings measure is the monthly wage rate of full-time workers, calculated from gross earnings of dependent wage and salary workers. For all countries (except Finland) part-time workers are excluded from the analysis. Only individuals for whom continuous earnings histories are available throughout the period are included in the samples.

3 Methods of mobility measurement

3.1 Measures based on transition matrices

One method of analysing income mobility is to define n income states in the first and last year of the observation period and to look at the corresponding transition matrix P. The elements p_{ij} present the probability of transferring to state j for those starting in state i. We define income states as quintiles of the contemporaneous income distribution. With this definition we also avoid the problem of top coding in the data. Shorrocks (1978b) suggests some mobility indices based on the transition matrix and discusses their properties. These

indices determine the dynamic structure if the process governing transitions follows a Markov chain. Geweke et al. (1987) extend the discussion to continuous time Markov chains. We use the following indices:

The trace index is defined as

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

and is related to the mean exit time from state i, which is $\frac{1}{1-p_{ii}}$.[2]

Bartholomew's index calculates the the average number of quintile jumps weighted by the equilibrium distribution $\pi P = \pi$.

$$M_B(P) = \sum_{i=1}^{n} \pi_i \sum_{j=1}^{n} p_{ij}|i - j| \tag{2}$$

The second eigenvalue index makes it possible to compare different time periods under the assumption that the underlying process is a Markov chain. If λ_2 is the second largest eigenvalue (ordered by absolute value), the second eigenvalue index is defined by

$$M_E(P) = 1 - |\lambda_2| \tag{3}$$

Mobility measures based on transition matrices are highly robust against data contamination (Cowell and Schlüter, 1998) and also against irregularities in the samples for cross country comparisons. However, the robustness comes at the cost of using a rather limited amount of information for their construction. First, the distance of the move between categories is not taken into account in the calculations[3]. Second, emphasis is based only on the comparison of wages in two years and many details of the earnings history are lost. Hence we introduce a second class of mobility measures tracking earnings over the full period.

[2] $M_T(P)$ can be written as $\sum_{i=1}^{n}(1-p_{ii})/(n-1)$ which is the inverse of the harmonic mean of the mean length of stay scaled by $n/(n-1)$.

[3] This although it might be of great importance for mobility, is nevertheless an advantage for comparative purposes across countries.

3.2 Summary measures

This group of mobility indices describe the relationship of wage inequality and mobility. As individuals change their relative position in the income distribution over time, it is plausible that income aggregated over several time periods will be less unequal than in a single time period. The idea is that the measure of inequality of aggregate income captures dynamic influences of mobility as well as inequality. Further, variation in flow variables like income depends on the length of the accounting period chosen. It is commonly supposed that inequality of aggregate income falls, as the accounting period is lengthened. Following this approach Shorrocks (1978a) suggests to measure mobility by the extent to which the income distribution is equalised as the accounting period is extended. We have income given for N individuals over T years and write this as a matrix $Y = (y_{it})$ where y_{it} is i's income in year t and the distribution of income in year t is given by the vector $y_t = (y_{1t}, \ldots, y_{Nt})$. Based on a measure of inequality $I(y_t)$ for a given year t we estimate the extent to which the index $I(.)$ is lower for income averaged over $T > 1$ years compared with income in a single year. We calculate i's average income by $y_i^T = 1/T \sum_{t=1}^{T} y_{it}$ and denote the average distribution of income by $y^T = (y_1^T, \ldots, y_N^T)$. Then we express the inequality of these "smoothed" incomes as a proportion of a weighted average of single-year inequality. We use $\eta_t = \sum_{i=1}^{N} y_{it} / \sum_{t=1}^{T} \sum_{i=1}^{N} y_{it}$, the share of total earnings that accrued in year t, as weights and calculate the ratio

$$R(Y) = \frac{I(y^T)}{\sum_{t=1}^{T} \eta_t I(y_t)} \tag{4}$$

which measures the rigidity of the income system. The associated mobility index is then

$$M_S(Y) = 1 - R(Y) \tag{5}$$

The calculation of the index requires two choices: an inequality index and the number of time intervals over which to aggregate. Varying the index $I(y_t)$ and T, the length of the time interval, gives us more information on the structure

of income mobility than a single index. We choose several inequality measures which place emphasis on different portions of the income distribution. Further, we compute $M_S(Y)$ for $T = 2$ to $T = 11$ and plot the results graphically. For measuring inequality we use the Gini coefficient

$$I_{gini}(y) = \frac{1}{2N^2\bar{y}} \sum_{i=1}^{N} \sum_{j=1}^{N} |y_j - y_i| \tag{6}$$

and inequality measures from the general entropy class, which are defined by

$$GE_\alpha(y) = \frac{1}{N} \frac{1}{\alpha(\alpha-1)} \sum_{i=1}^{N} \left[\left(\frac{y_i}{\bar{y}} \right)^\alpha - 1 \right] \tag{7}$$

with sensitivity parameter $\alpha \neq 0, 1$. A higher α means that the index is more sensitive with respect to inequality in the upper part of the distribution. Mean income is denoted by $\bar{y}$. From this group we choose the mean log deviation measure, the Theil1 and Theil2 indices

$$GE_0(y) = I_{mld}(y) = \frac{1}{N} \sum_{i=1}^{N} \log \left(\frac{\bar{y}}{y_i} \right) \tag{8}$$

$$GE_1(y) = I_{theil1}(y) = \frac{1}{N} \sum_{i=1}^{N} \frac{y_i}{\bar{y}} \log \left(\frac{y_i}{\bar{y}} \right) \tag{9}$$

$$GE_2(y) = I_{theil2}(y) = \frac{1}{2N} \sum_{i=1}^{N} \left[\left(\frac{y_i}{\bar{y}} \right)^2 - 1 \right] \tag{10}$$

Taking into account different patterns of wage inequality within groups of individuals with the same observable characteristics, we can decompose the mobility measure into between and within components. Inequality indices from the general entropy class have the property of additive subgroup decomposability. Suppose we have K different groups of individuals, such that each individual belongs to exactly one group. The number of individuals in the k-th group is n_k, $\sum_{k=1}^{K} n_k = N$, and the inequality index within this group is denoted by $GE_{\alpha k}$. The general entropy measures can then be decomposed into parts, which

describe inequality within groups and inequality between groups (Shorrocks, 1980):

$$GE_\alpha(y) = GE_\alpha^W(y) + GE_\alpha^B(y) = \sum_{k=1}^{K} w_k GE_{\alpha k}(y) + GE_\alpha^B(y) \tag{11}$$

with

$$w_k = \left(\frac{n_k}{N}\right)\left(\frac{\bar{y}_k}{\bar{y}}\right)^\alpha$$

The within part of inequality is a weighted sum of the indices applied to the groups separately. Between group inequality is found by applying the index to the mean wages of the groups. We can think of between inequality as the part of inequality which can be explained by the observable individual characteristics. If we require further that the weights in the within part w_k sum to unity, we can find a decomposition for the mean log deviation index and the Theil1 index by

$$GE_0^W(y) = \sum_{k=1}^{K} \frac{n_k}{N} GE_{0k}(y) \tag{12}$$

$$GE_1^W(y) = \sum_{k=1}^{K} \frac{n_k \bar{y}_k}{N\bar{y}} GE_{1k}(y) \tag{13}$$

Using this property of the inequality indices, we can decompose the mobility index into a between and within part by

$$M_S(Y) = \sigma^W M_S^W(Y) + \sigma^B M_S^B(Y) \tag{14}$$

with

$$\begin{aligned}
M_S^W(Y) &= 1 - \frac{I^W(y^T)}{\sum_{t=1}^{T} \eta_t I^W(y_t)} \\
M_S^B(Y) &= 1 - \frac{I^B(y^T)}{\sum_{t=1}^{T} \eta_t I^B(y_t)} \\
\sigma^W &= \frac{\sum_{t=1}^{T} \eta_t I^W(y_t)}{\sum_{t=1}^{T} \eta_t I(y_t)} \\
\sigma^B &= \frac{\sum_{t=1}^{T} \eta_t I^B(y_t)}{\sum_{t=1}^{T} \eta_t I(y_t)}
\end{aligned}$$

This is shown by

$$\begin{aligned}
\sigma^W \left[1 - \frac{I^W(y^T)}{\sum_{t=1}^T \eta_t I^W(y_t)}\right] + \sigma^B \left[1 - \frac{I^B(y^T)}{\sum_{t=1}^T \eta_t I^B(y_t)}\right] &= \\
\sigma^W + \sigma^B - \sigma^W \frac{I^W(y^T)}{\sum_{t=1}^T \eta_t I^W(y_t)} - \sigma^B \frac{I^B(y^T)}{\sum_{t=1}^T \eta_t I^B(y_t)} &= \\
\frac{\sum_{t=1}^T \eta_t \left[I^W(y_t) + I^B(y_t)\right]}{\sum_{t=1}^T \eta_t I(y_t)} - \frac{I^W(y^T)}{\sum_{t=1}^T \eta_t I(y_t)} - \frac{I^B(y^T)}{\sum_{t=1}^T \eta_t I(y_t)} &= \\
1 - \left[R^W(Y) + R^B(Y)\right] = 1 - R(Y) = M_S(Y)
\end{aligned}$$

Tracking earnings over the full period restricts the sample to individuals for whom continuous wage histories are available and the calculations of these measures are based on relatively stable earnings careers. Contrary to the indices based on transition between quintiles the summary indices M_S are affected by the top coding in the data. We conduct some sensitivity analyses to get a quantitative assessment of the extent to which the calculations are affected by censoring and present the results in the empirical part (section 4.3).

4 Results

The first part of the empirical analyses concerns a comparison of wage mobility in Austria with other OECD countries. We draw on studies of the OECD (1996, 1997) covering eight OECD countries and calculate similar measures of wage mobility for Austria. The OECD studies cover the period 1986-1991. Subsequently we perform the analysis of wage mobility for Austria for the extended period up to 1996. This longer time horizon should give a better estimate of the equalising effect of wage mobility.

4.1 Comparison of mobility among OECD countries: 1986-1991

A summary of measures for earnings mobility in Denmark, Finland, France, Germany, Italy, Sweden, UK, USA, and Austria between 1986 and 1991 are presented in Table 1. Mobility is examined by the evaluation of transition

matrices. The OECD put emphasis on full-time wage and salary earners. No information on working-time is available in the Austrian data and therefore, we consider all workers.[4] In the examination of transition matrices we include all individuals, who were employed more than 180 days in both years relevant for the transitions, but not necessarily throughout the observation period. Thus we have a sample size of 24,927 instead of 21,942 for the 1986-1991 period.

Table 1 presents results from the transition matrix analysis. The first column gives measures of cross sectional inequality in 1991. According to the ratio of the 90th to the 10th wage percentile the countries with highest wage inequality are the USA, UK and France. The other European countries show smaller values of inequality. If we turn to columns 2 to 5, which examine quintile moves in the wage distribution between 1986 and 1991, we cannot find clear evidence for the presumption that countries with highest inequality also have the highest wage mobility. Denmark and Finland appear to be the most mobile countries and France is among the most immobile ones. Approximately half of the workers in all of the countries were in a different earning quintile in 1991 than in 1986, and between 7 and 22 per cent moved at least two quintiles up or down. Excluding Austria and Finland, the range shrinks from 11 to 15 per cent.

The results in Table 1 suggest that Austria has by far the lowest rate of wage mobility. To find an explanation for this result we examine the transition matrices for men and women more closely[5]. It turns out that about 40% of women are in the bottom quintile in both years and this is at the same time the most persistent state for women. Their retention rate[6] in the first quintile is 78%. Consequently only a small percentage of men is in the bottom quintile and for them transitions from the first quintile to higher ones are much more likely.

[4]The OECD (1997) reported similar results for full-time workers and for the total work force. Part-time work is very unusual for men in Austria. For women, the share of part-time work is below the European average. The share of part-time work 1990 was 20% for women and 1.5% for men; it was rising during the 1990's.

[5]All transition matrices are available from the authors upon request.

[6]We refer to the retention rate as percentage of those in a quintile in 1986 who are still in the same quintile in 1991, as opposed to transition rates between different quintiles.

One can argue that this finding is due to the large share of part-time work among women for which we cannot correct. Therefore we examine transitions of men in the male wage distribution in the next step. The results are given in columns 6 to 9 of Table 1. For men a comparison of Austria with the other countries shows that wage mobility in Austria is low but similar to mobility in countries like France. Low wage mobility in Austria is especially due to the small probability of moving more than one wage quintile within 6 years.

Next we examine the extent to which wage mobility reduces cross-sectional wage inequality observed in a single year by the framework introduced in section 3.2. In Table 2 the summary mobility index M_S is represented as the percentage reduction in inequality when four different indices of wage inequality are used. A value of zero indicates no equalising effect from wage mobility, because wages averaged over a multi-year period are no more equally distributed than wages in a single year. From the results in Table 2 we learn that earnings inequality falls as earnings are averaged over a six-year period. In the country comparison the overall equalising effect of mobility is always less than one-third and most often around 10 per cent. This suggests that a large share of cross-sectional wage inequality is quite persistent. Moreover, the choice of the inequality index matters. The indices differ in the implicit weighting they place on inequality at different points in the distribution. The mean log deviation index is most sensitive to inequality near the bottom of the distribution; the Gini index is most sensitive in the middle, the Theil2 index at the top, and the Theil1 index at both extremes of the distribution. For all countries, the Gini index indicates a much weaker equalising effect than the other three indices. This suggests that workers in the middle of the income distribution have relatively stable earnings. Wage differentials are smoothed by mobility mainly at the tails of the distribution.

Leaving out Austria country rankings in Table 2 depend on the chosen inequality index and there emerges no clear picture which countries are the most mobile or most immobile ones. For Austria Table 2 confirms the results from above with respect to the weak equalising effect of earnings mobility. However, Austria

has by far the lowest mobility according to all inequality indices. Applying the mean log deviation index we find that inequality is reduced by 6.6 per cent when income is averaged over 6 years. For all other countries, the equalising effect is about twice as large as for Austria (see also Figure 2).

An evident question is if this outstanding result is due to the problems with our dataset, namely the inclusion of part-time workers and the top coding of wages. First we note that the result seems not mainly to depend on the inclusion of part-time workers. Considering annual earnings (instead of wage rates) of all continuously employed workers, presented in the bottom of Table 2, does not change the picture for wage mobility in Austria. Second, for an assessment of the effect of top coding it is useful to study the results for different population groups and single out low wage groups who are less affected by censoring e.g. young workers and women.

Table 3 shows that the equalising effect differs among groups. For all countries the strongest equalising effect appears among workers under the age of 25 in the initial period. Youth's earnings paths are relatively volatile, which may reflect job-shopping. We note that the value of mobility for young workers is also maximal from all groups in Austria and although it is the smallest in country comparison, its dimension is not out of range [7]. The equalising effect of mobility is above average for workers changing employers at least once during 1986 and 1991. For this group the index for Austria fits in the range of the other countries values' too[8]. The picture is less clear if we move attention to the differences between the sexes. For all countries except Austria and the UK, where the relationship is reversed, women are considerably more mobile than men. Although a high share of female part-time workers are included in the Austrian dataset, who might be more mobile due to changes in hours worked, the index is less than half of the other countries' (except UK). We might think of at least three possible explanations for the reverse pattern of female/male wage mobility in Austria. First, the subsamples suffer from different problems in the

[7] The exceptional value for Germany is due to the inclusion of apprentices in the data.

[8] The group of workers changing their employer may be highly correlated with young age.

dataset, which might impair the comparability of indices. As already mentioned part-time is higher among women and wage censoring is higher among men. Second, we only include individuals employed more than 180 days in the sample, which restricts attention to very stable female careers where any leaves due to maternity are excluded. Third, as we have mentioned above, female wages are concentrated on the bottom of the wage distribution and the chosen indices may still be relatively insensitive to movements at the very bottom.

For further investigation of the effect of wage censoring on the summary indices, we conduct some sensitivity analysis to evaluate the magnitude of the effect. We refer the reader to section 4.3.

4.2 Wage mobility in Austria: 1986-1996

An observation period of six years is very short compared to the total time an individual spends on average in the labour force. Therefore it is most interesting to extend this period to get a better approximation of the effect of mobility on lifetime income inequality. We can do this for Austria where we have data available from 1986 to 1996. We conduct our analysis solely for individuals with nonzero earnings in all eleven years. The sample size is reduced to 14,912 (resp. 19,504 for the transition matrix based analyses). Descriptive statistics of the variables used are given in Table 7.

For the extended time period the results from the previous section are repeated in Tables 4 and 5. As expected, mobility increases over the longer period, but the general picture remains unchanged. The additional mobility indices based on the transition matrices M_T, M_B and M_2 show again that young workers and workers who experienced at least one employer change are the most mobile groups (Table 4). Most likely these groups are highly correlated and it would be interesting to examine the effects of employer changes for different age groups or positions in the labour market career. We leave this issue to future research. The distributions of quintile moves over the longer period come close to the OECD country averages in the short period. The summary indices M_S are still

below the corresponding values for other countries in the shorter period. This may be due to the different samples used. In the transition matrix analysis we include more unstable employment careers.

To obtain a better overview of the development of wage mobility as the time horizon is increased we apply the method suggested in Section 3.2. We calculate the summary measure M_S for increasing time horizons and plot the results against the time axis. The slopes of these mobility curves signify how rapidly incomes approach their permanent average values. A steep slope indicates that income averaged over a further year reduces inequality considerably. As the curve flattens, averaged incomes are close to a permanent value and inequality is not reduced further by mobility. Figure 1.1 reports the per cent reduction in inequality over the eleven-year period for four different inequality indices. As expected there is no indication that the full equalising effect of mobility is exhausted within the first six years. Approximately two thirds of the equalising effect of averaging earnings over eleven years are realised after six years. According to the different indices the percent reduction in inequality, when averaging income over eleven years, amounts to four to ten per cent. Even considering this long period the equalising effect of mobility in Austria is below the values for the other countries after six years.

Figures 1.2 to 1.5 show the summary measures for different groups of workers. Let us look at extreme cases. Workers with no change of employers have a very stable development of wages, the degree of wage mobility is modest. It is interesting to compare the curves for the two most mobile groups, which are young workers and those with employer changes. For young workers, the mobility curve seems to flatten at the end of the observation period. This may reflect the transitory nature of income changes which young workers experience. This kind of variation ends as the individuals arrives at a certain older age. Employer changes, in contrast, seem to present permanent income changes, which result in an almost linearly rising mobility curve.

The next part of the empirical analysis examines the distinction between within- and between-group mobility. The sample is divided into 24 groups according

to gender, age (three groups), occupation (2 groups) and change of employer (2 groups). In Table 6, we see that 38 per cent of cross-section inequality in 1986 is due to differences in average earnings between the various groups, while the larger part reflects differences within them. The third and fourth columns of Table 6 show the total equalising effect of wage mobility and the share due to cross-group convergence of average earnings. The between-group mobility effect is always very weak and amounts to seven per cent at most. Thus the part of mobility that can be explained by observable characteristics is moderate and the equalising effect of mobility occurs predominantly within groups. Figure 3 plots these results graphically. We notice that while total mobility is rising with longer time periods, the between share only rises up to 6 years and remains stable after that. Which means, that only up to six years the explainable part of mobility gains from increasing the time horizon.

4.3 Sensitivity of Summary Indices due to Censoring

In this section we try to assess the magnitude of the effect of top coding in the wage data on the summary measures M_S. From the definition of the index in equations (4) and (5) it is not clear in which direction the censoring problem might affect the indices. Using censored wage observations truncates the "true" distribution of yearly wages and shifts the distribution of average wages to the left. Consequently both, the weighted index of yearly inequality in the denominator of (4) and the index of averaged inequality in the numerator are underestimated and the effects on the mobility index are partly offsetting each other. As it is difficult to approximate the impact of censoring systematically we add some empirical considerations. In the following we make several variations to our data set and compare the effects on the indices for the total sample, men and women separately.

1. We approximate the censored wages by a Pareto distribution, with parameters estimated from the upper part of the wage distribution. This method is usually applied for inequality measurement (Gusenleitner et al., 1998)

as the Pareto distribution is seen as a good approximation for the upper part of the wage distribution (Cowell, 2000). Randomly assigning values to the censored observations in the panel introduces extra mobility. But now at least the denominator in equation (4) should be estimated more precisely. Therefore the indices calculated with this method provide an upper bound of mobility. From the results, given in Table 8, we learn that for women the index hardly changes, whereas it rises considerably for men. For the total sample the upper bound measure of mobility states the equalising effect of mobility with 8.5%, which is 2 percentage points higher than in the original sample. In comparison with other countries (Table 3) this is still a low value of mobility.

2. We investigate the effect of extra censoring on the mobility index. In the original sample 22% of male individuals are censored at least once during 1986-1991, but only 6% of females. We examine the effect of lowering the contribution assessment ceiling so far that in the resulting sample about 20% of female individuals are censored. We find that extra censoring raises the index for all categories. This suggests that censoring actually leads to an overestimation of mobility.

3. If we exclude all observations with wages lower than five times the wage for marginal work from the sample we will also drive most part-time workers out of the sample. The effect on mobility is ambiguous. For the total sample mobility increases, whereas in the male and female wage distributions we find less mobility.

4. In the original sample the wage for censored observations is set equal to the contribution assessment ceiling. In this variant we examine the effect of approximating these observations with estimated mean values (taken from the Pareto distribution). This correction should at least give a better approximation to inequality. It turns out that in this case we obtain the smallest values for mobility. Again the results suggest an overestimation of mobility by censoring.

Summarising, the results of the variations on the sample we find some evidence for overestimating mobility by the use of censored wage observations. An approximation of the upper bound of mobility still shows that in Austria wage mobility is comparatively low, especially for women. We also find that the minimum wages included in the analysis affect the mobility measure. On the whole the summary indices appear to be quite sensitive to variations in the data set and should be treated with caution if applied for comparative purposes on different data sources.

5 Conclusion

In this paper we used administrative data to analyse the extent of wage mobility in Austria for the time period 1986-96. We find that mobility reduces wage inequality by 3 - 7 per cent, depending on the inequality index chosen, when a six-year time period is considered. For Denmark, Finland, France, Germany, Italy, Sweden, UK, and USA the equalising effect of mobility is twice as large as for Austria. As there is evidence that the equalising effect of wage mobility on life-time incomes is not exhausted within six years we consider an eleven-year horizon for Austria. Wage mobility increases slightly to 4 - 10 per cent. Considering different groups of workers, we find that wage mobility reduces the cross-sectional inequality especially for younger workers and workers changing employers during the observation period. A more formal decomposition into within- and between-group mobility shows that the between-group mobility effect is always very weak and amounts to seven per cent of total mobility at most. This implies that the equalising effect of mobility occurs predominantly within groups.

Compared to all countries, wage mobility in Austria seems to be extremely low. Therefore we examine the validity of the results with respect to possible problems with the data set, which are the inclusion of part-time workers and censoring of wage data due to the contribution assessment ceiling of the social security system. Highly robust indices are measures based on quintile transi-

tions of men. Applying these measures in a comparison across OECD countries, Austria is placed on the lower end of the ranking next to France. Young workers, who are less affected by censoring, are a very mobile group in all countries. The indices for Austria are lowest in country comparison, but the values are in a comparable range. In Austria women are a highly immobile group although their wages are concentrated at the bottom of the distribution. According to results of sensitivity analysis we find some evidence for overestimating mobility by the use of censored wage observations. An approximation of the upper bound of mobility still shows that in Austria wage mobility is comparatively low, especially for women.

We argue that the results are in line with other evidence showing rigid relative wage structures in Austria. An explanation would be that the pronounced macroeconomic real wage flexibility reduces the demand for micro flexibility (Teulings and Hartog, 1998).

However, we do not claim that the macroeconomic real wage flexibility makes micro flexibility completely unnecessary. We can only conclude that micro adjustments do not occur on the wage level. One important feature of the Austrian labour market is the considerable amount of job turnover and large gross flows between employment unemployment and out of the labour force. These high quantity adjustments are induced at least partly by the rigidity of the micro wage structures (Hofer et al., 2001). The current analysis is concentrated on continuously employed wage earners. Therefore we cannot investigate moves of wage earners to unemployment, self employment or out of the labour force. We refer these interesting topics to future research.

References

Aaberge, R., Björklund, A., Jäntti, M., Palme, M., Pedersen, P., and Smith, N. (1996). Income inequality and income mobility in the Scandinavian countries compared to the United States. *Discussion Paper*, (168). Statistics Norway.

Atkinson, A., Bourguignon, F., and Morrisson, C. (1992). *Empirical studies of earnings mobility*. Harwood Academic Publishers, Philadelphia.

Beblo, M. and Knaus, T. (2000). Measuring income inequality in Euroland. *Luxembourg Income Study Working Paper*, (232). Luxembourg.

Buchinsky, M. and Hunt, J. (1999). Wage mobility in the United States. *Review of Economics and Statistics*, 81:351–368.

Calmfors, L. and Driffill, J. (1988). Bargaining structure, corporatism and macroeconomic performance. *Economic Policy*, 6:13–61.

Cowell, F. and Schlüter, C. (1998). Income mobility: a robust approach. *DARP Discussion Paper*, (37). LSE, London.

Cowell, F. A. (2000). *Measuring inequality*. Hemel Hempstead: Harvester-Wheatsheaf, second edition edition.

Dickens, R. (2000). The evolution of individual earnings in Great Britain: 1975-95. *The Economic Journal*, 110:27–49.

Förster, M. F. (2000). Trends and driving factors in income distribution and poverty in the OECD area. *Labour Market and Social Policy Occasional Papers*, (42). OECD, Paris.

Fuess, S. M. and Millea, M. (2001). Pay and productivity in a corporatist economy: evidence from Austria. *IZA Discussion Paper*, (244). Bonn.

Geweke, J., Marshall, R. C., and Zarkin, G. A. (1987). Mobility indices in continuous time Markov chains. *Econometrica*, 54:1407–1423.

Gusenleitner, M., Winter-Ebmer, R., and Zweimüller, J. (1998). The distribution of earnings in Austria, 1972-1991. *Statistisches Archiv*, pages 275–290.

Hofer, H., Pichelmann, K., and Schuh, A. (2001). Price and quantity adjustments of the Austrian labour market. *Applied Economics*, 33:581–592.

Levy, F. and Murnane, R. (1992). U.S. earnings levels and earnings inequality: a review of recent trends and proposed explanations. *Journal of Econometric Literature*, 30:333–381.

Machin, S. (1998). Recent shifts in wage inequality and returns to education. *National Institute Economic Review*, 166:87–96.

OECD (1996). Earnings inequality, low-paid employment and earnings mobility. *Employment Outlook 1996*, pages 59–108. Paris.

OECD (1997). Earnings mobility: taking a longer run view. *Employment Outlook 1997*, pages 27–61. Paris.

Pekkarinen, J., Pohjola, M., and Rowthorn, B., editors (1992). *Social Corporatism*. Clarendon Press, Oxford.

Shorrocks, A. F. (1978a). Income inequality and income mobility. *Journal of Economic Theory*, 46:376–393.

Shorrocks, A. F. (1978b). The measurement of mobility. *Econometrica*, 46:1013–1024.

Shorrocks, A. F. (1980). The class of additively decomposable inequality measures. *Econometrica*, 48:613–625.

Teulings, C. and Hartog, J. (1998). *Corporatism or competition?* Cambridge University Press, Cambridge, UK.

Table 1: Alternative measures of five-years earnings mobility for full-time wage and salary earners, 1986-1991

	Cross-sectional earnings inequality	Transitions among quintiles Total Sample			Men in the male distribution			
	Ratio of 90th to 10th percentile wage, 1991	Average quintile move	Stayed in the same quintile %	Moved up or down one quintile %	Moved 2 or more quintiles %	Average quintile move	Stayed in the same quintile %	Moved up or down one quintile %	Moved 2 or more quintiles %
Austria*	2.68	0.48	61.7	31.1	7.3	0.55	56.7	34.3	9.0
Denmark	2.15	0.76	47.6	35.6	16.8	0.78	46.3	36.5	17.2
Finland*	2.47	0.89	44.1	34.4	21.5				
France	3.26	0.59	56.8	32.0	11.2	0.58	56.6	32.6	10.9
Germany	2.52	0.62	53.0	35.7	11.2	0.65	51.8	36.5	11.7
Italy	2.64	0.68	50.6	35.3	14.1	0.68	50.2	36.0	13.8
Sweden	2.11	0.68	52.7	33.8	13.5	0.77	46.3	38.4	15.3
UK	3.28	0.72	48.1	36.8	15.1				
USA	3.66	0.73	48.8	35.5	15.7	0.79	46.6	35.7	17.7

* Austria and Finland all workers
Source: OECD (1996), own calculations

Table 2: Percentage reduction in single-year earnings when earnings are averaged over 1986-1991

Inequality Index	Austria	Denmark	France	Germany	Italy	UK	USA
Weekly/monthly earnings of continuously full-time workers*							
Mean log deviation	6.6	11.0	11.0	15.3	12.1	11.4	11.9
Gini	2.5	5.5	4.3	4.5	5.6	5.7	4.8
Theil I1	5.7	10.9	13.7	12.7	11.3	11.8	10.5
Theil I2	5.4	11.7	27.2	18.6	11.6	15.6	12.5
Weekly/monthly earnings of continuously full-time workers, aged 25-49 only*							
Mean log deviation	5.6	11.3	11.1	8.7	11.4	11.1	11.6
Gini	2.1	5.6	4.2	3.6	5.3	5.7	4.9
Theil I1	4.8	11.5	14.4	10.2	11.0	11.9	10.3
Theil I2	4.6	12.5	29.7	19.7	11.4	16.6	12.2
Annual earnings of all continuously employed workers							
Mean log deviation	8.2	19.7	19.0	22.3	26.6		19.3
Gini	3.0	5.9	5.6	6.2	5.9		5.0
Theil I1	6.9	12.9	12.0	15.5	15.9		10.9
Theil I2	6.3	10.2	11.8	17.3	11.7		10.5

* Austria all workers

Source: OECD (1997), own calculations

Table3: Percentage reduction in single-year earnings when earnings are averaged over 1986-1991, by worker characteristics

(Earnings inequality is measured by mean log deviation index)

Weekly/monthly earnings of continuously full-time workers*

	Austria	Denmark	France	Germany	Italy	UK	USA
Total	6.6	11.0	11.0	15.3	12.1	11.4	11.9
Sex							
Female	7.3	18.3	15.4	19.2	16.9	10.7	16.1
Male	8.8	11.0	10.6	16.2	11.7	13.6	12.5
Age							
Under 25	18.2	25.3	29.3	48.5	30.5	19.5	27.3
25-34	8.2	14.9	15.4	12.3	16.3	14.7	14.7
35-49	4.2	9.4	9.3	6.8	9.1	9.4	9.4
50-64	2.8	6.0	8.4	6.9	9.7	8.8	8.9
Change of employer							
No change	3.4	6.1	10.2	11.7	9.2	9.9	8.1
At least one change	13.2	15.5	15.8	24.5	18.8	13.2	17.3

*for Austria all workers
Source: OECD (1997), own calculations

Table 4: Alternative measures of eleven-years earnings mobility for Austrian wage and salary earners, 1986-1996

	Transitions among quintiles					Mobility Indices		
	Average quintile move	Stayed in the same quintile %	Moved up or down one quintile %	Moved 2 or more quintiles %	Moving upwards %	Moving downwards %	Trace	Bartholomew	2.Eigenvalue
Total	0.658	51.7	35.1	13.2	23.4	24.9	0.60	0.66	0.26
Female	0.632	54.4	32.1	13.5	24.5	21.1	0.61	0.63	0.23
Male	0.672	50.1	36.9	13.1	22.8	27.2	0.66	0.69	0.31
White-collar worker	0.662	54.8	30.3	14.9	26.6	18.7	0.64	0.58	0.27
Blue-collar worker	0.653	48.7	39.7	11.6	20.5	30.9	0.66	0.62	0.35
Age under 25	0.917	38.1	38.9	23.1	44.3	17.6	0.75	0.87	0.42
25-45	0.614	53.6	34.9	11.4	19.5	26.8	0.58	0.61	0.24
46-64	0.430	65.5	28.7	5.8	7.9	26.6	0.47	0.43	0.19
No change of employer	0.453	61.5	32.7	5.7	18.2	20.3	0.49	0.45	0.16
At least one change	0.810	44.3	36.9	18.8	27.3	28.4	0.69	0.81	0.36

Table 5: Percentage reduction in single-year inequality when earnings are averaged over 1986-96, by worker characteristics

	MLD	Gini	Theil I1	Theil I2
Total	9.7	3.8	8.6	8.2
Female	10.1	4.3	8.8	8.2
Male	12.4	4.9	11.2	10.5
Age under 25	20.4	9.3	18.9	18.6
25-45	8.8	3.4	7.8	7.3
46-64	5.4	1.6	4.5	4.1
Blue-collar worker	11.2	5.6	10.7	10.9
White-collar worker	10.4	3.2	9.0	8.3
No change of employer	5.4	2.1	4.9	4.8
At least one change	15.0	6.2	13.3	12.5

Table 6: Earnings inequality and mobility "within" and "between" groups, 1986-1996
(Inequality is measured by the mean log deviation index)

	Inequality Index		Mobility Index	
Earnings averaged over	Total Inequality	"Between" share of total inequality* (percent)	Total Mobility	"Between" share of total mobility* (percent)
1986	0.074	37.7	0.0	x
1986-87	0.070	38.3	2.0	2.8
1986-88	0.068	38.7	3.3	3.6
1986-89	0.066	38.9	4.5	4.5
1986-90	0.063	39.0	5.7	5.6
1986-91	0.061	39.0	6.7	6.5
1986-92	0.059	39.0	7.6	6.9
1986-93	0.058	39.0	8.2	6.9
1986-94	0.057	39.0	8.8	6.7
1986-95	0.056	39.0	9.2	6.5
1986-96	0.056	39.1	9.7	6.3

x: not applicable
a) The total work force is dived into 24 groups defined by sex (2 groups), age(3 groups), worker-type (2 groups) and change of employer (2 groups).

Table 7: Descriptive Statistics

	Individuals employed more than 180 days in 1986 and 1996		Individuals continuously employed more than 180 days 1986 - 1996	
	N	%	N	%
Total	19,504	100.0	14,912	100.0
Female	7,149	36.7	4,801	32.2
Male	12,355	63.3	10,111	67.8
Age under 25	3,954	20.3	2,269	15.2
25-45	13,651	70.0	10,906	73.1
46-64	1,895	9.7	1,737	11.6
Blue-collar worker	10,003	51.3	7,516	50.4
White-collar worker	9,501	48.7	7,396	49.6
No change of employer	8,314	42.6	8,069	54.1
At least one change	11,174	57.3	6,837	45.8
Maximum censored	2,544	13.0	2,285	15.3

Table 8: Variations of the sample, mobility calculated by Mean Log Deviation index, observation period 1986 - 1991.

	Total Sample	Men	Women
Original Sample	6.6	7.3	8.8
Approximation with Pareto distribution	8.6	7.5	12.3
Introduction of extra censoring	7.6	7.7	11.0
Increased minimum wage	7.1	5.9	8.1
Mean Value for censored observations	5.8	6.6	7.1

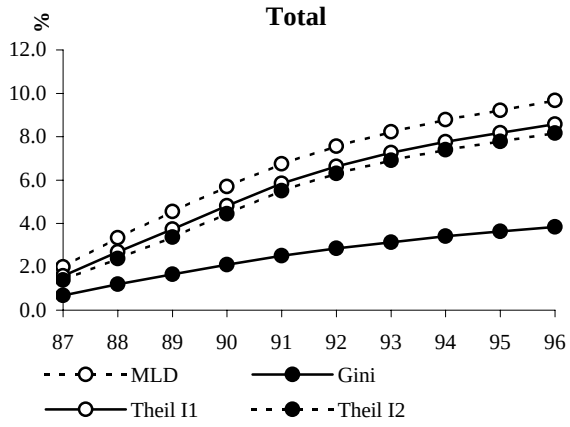

Figure 1.1

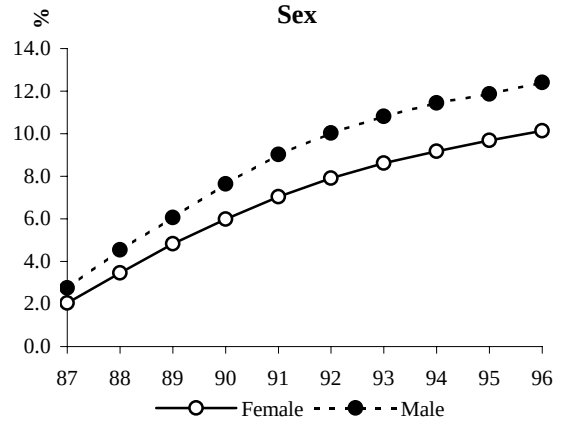

Figure 1.2

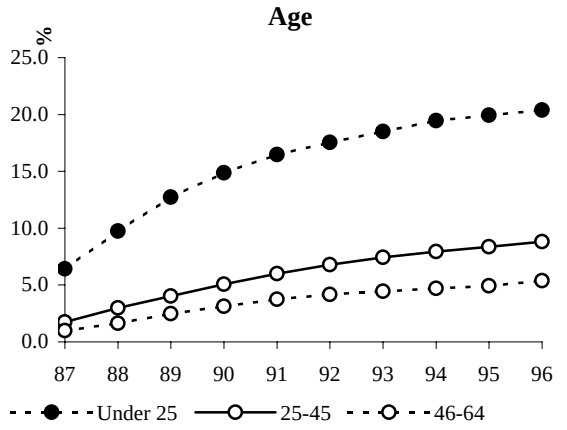

Figure 1.3

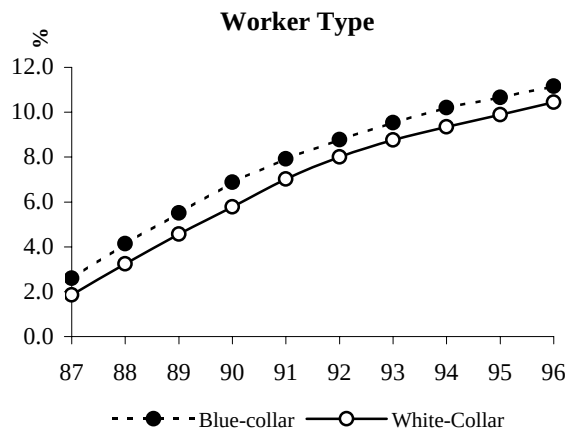

Figure 1.4

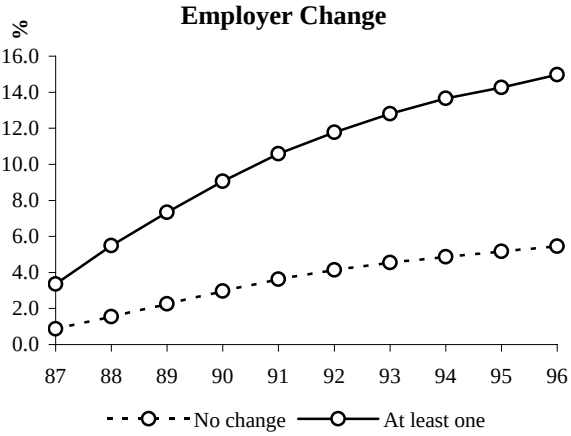

Figure 1.5

Figure 1: Summary measure of mobility to establish how mobility reduces inequality as the time horizon increases. Different inequality indices in 1.1, different worker characteristics in 1.2 - 1.5 (mobility index based on the mean log deviation measure).

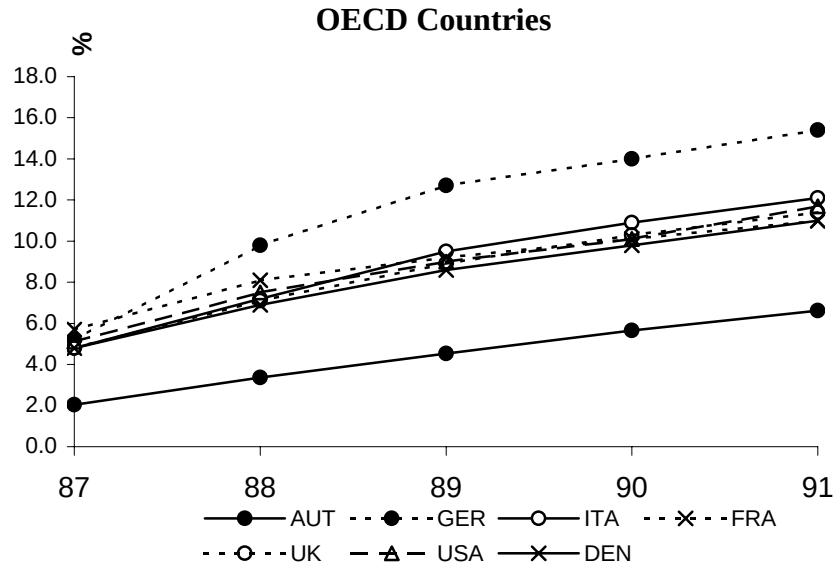

Figure 2: Summary measure of mobility to establish how mobility reduces inequality as the time horizon increases. Different OECD countries (mobility indices based on the mean log deviation measure).

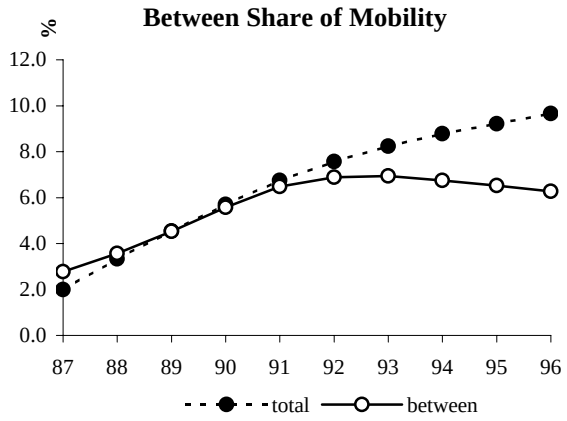

Figure 3: Development of total mobility and the between share of mobility as the time horizon increases (mobility indices based on the mean log deviation measure).

Authors: Helmut Hofer, Andrea Weber

Title: Wage Mobility in Austria 1986–1996

Reihe Ökonomie / Economics Series 108

Editor: Robert M. Kunst (Econometrics)
Associate Editors: Walter Fisher (Macroeconomics), Klaus Ritzberger (Microeconomics)

ISSN: 1605-7996

Stumpergasse 56, A-1060 Vienna • ☎ +43 1 59991-0 • Fax +43 1 5970635 • http://www.ihs.ac.at

ISSN: 1605-7996