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**Who is on the Rise in Austria:
Wage Mobility and Mobility Risk**

by

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Abstract:

In this paper we investigate earnings mobility in Austria from the angle of individual persons: earnings mobility over time has two aspects: positional changes and the volatility of earnings over time. Whereas the further is a positive outcome, more volatility as such can be seen as negative. We use Austrian data from tax authorities to find out how population characteristics are related to these two concepts of earnings mobility.

JEL: I320, J310
Keywords: Earnings mobility, earnings volatility, relative income positions.

1. Introduction

The study of income mobility is very important for giving a correct picture of inequality and poverty. Whereas income distribution assesses inequality at a point in time, income mobility – in particular upward mobility – can change the distribution over time considerably. Most observers see income mobility as an important feature of a society of equal opportunities. Higher income mobility can lead to a greater equalization of lifetime incomes, which can lead – provided that there are no borrowing constraints – to a more equal distribution of lifetime consumption. More mobility can, therefore, be seen as positive. On the other hand, higher mobility is not always predictable in nature; and adds to the uncertainty of the future consumption opportunities. Higher fluctuations in income will, therefore, be considered as negative.[1] These two aspects of mobility do not always get the same attention; the positive – equalizing – aspect of mobility often takes center stage, because it gives the poor a way to move up the social ladder. But at the same time, the volatility aspect can be seen as much more severe for low-income persons (Gottschalk, 1997), because those – if ever – are the ones hit by borrowing constraints.

Most research on income mobility is interested in establishing a 'macro' fact: How mobile is the society, how high are the chances that someone from the lowest quintile can move up to the top, is the US more mobile than Italy (Checchi et al, 1999), has mobility increased or declined over time?[2] Researchers then go on to explain these macro facts by, say, institutional conditions of the economy or the business cycle. Moreover, most of this research operates with transition matrices, showing the changes in positions over time. In contrast to this we are interested in the two aspects of mobility in more detail: moving up or down the ladder in terms of income positions, on the one hand, and the volatility of the income position at a particular point in time, on the other hand. To do so, we separate mobility into the change in income position between the beginning and the end of the observation period and the volatility of positions in the meantime.[3] These concepts are not features of the income distribution of an economy at a certain point in time, but features of individuals. Our focus, thus, is to construct (upward, downward) mobility and volatility indicators for individuals and

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[1] See Jun and Munasinghe (2004) for a model, where earnings follow a random walk and higher volatility of earnings leads to less job changing behavior because higher volatility increases the value of delaying a quit decision: you have a higher chance to get a big increase in your old firm.

[2] Income mobility calculations exist for many countries: see Hofer and Weber (2002) for Austria, Jarvis and Jenkins (1998) for the UK, Buchinsky and Hunt (1999) for the US and Buchinsky et al (2003) for France, Bigard (1998) for Italy or Gustafsson (1994) for Sweden. Atkinson et al (1992) survey the literature and modeling strategies up to 1990.

to relate these indicators to socio-economic characteristics to find out about their relation to particular population groups.

In contrast, most mobility studies only look at aggregate indicators for income mobility in a society. Some do differentiate these indicators by gender, age or education (Buchinsky et al, 2003, Gustaffson, 1994, or Jarvis and Jenkins, 1998), but they still stick to the aggregate level of observation to construct one mobility index, say, for males and females.

2. Data

Our analysis is based on data from the Austrian tax authority from 1994 to 2001. They cover the universe of employed workers paying personal income taxes in the Austrian province of Upper Austria. These tax data are complemented by data from social security records concerning firm information like industry and firm size. Individuals with wages below the minimum contribution level do not pay any income tax, and they are not registered in the social security data system.

In general, administrative tax data are more reliable than those of surveys: earnings come directly from the firm at the end of the year; they are required for tax purposes. Due to direct and administrative data collection, no recall errors are possible as is often the case with survey data. This limits the problem of considering transitory changes in incomes as an indication of measurement error. As in many administrative data sets, there is a lack of personal characteristics: education is only crudely available; there is no information on family status and working time. Therefore, we have to confine ourselves to standardized monthly incomes which were corrected by the number of working days in a month. The focus of our analysis is pre-tax labor earnings to look at market-based earnings. We have included into labor earnings all wage and salary income received in a calendar year adding any bonuses except severance pay.

Our sample comprises all male white- and blue-collar private sector workers as well as untenured government employees. It comprises 152.053 employees, for which eight yearly wages have been collected. Female workers have been eliminated because high part-time rates would make mobility analysis fragile. We concentrate our analysis on a balanced panel

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[3] See Abowd and Card (1989), Baker (1997), Baker and Solon (1999) or Biewen (2002) on studies about earnings dynamics who try to decompose earnings growth into permanent and transitory components.

of employees: all individuals who were employed at least once in every year of the observation period to minimize problems with undefined periods. [4]

Most analyses of wage or earnings mobility suffer from the problem of top coding; i.e. top incomes are more often censored due to contribution ceilings or open questions in household surveys. Therefore, these studies have to rely on robust methods for measuring earnings mobility. Typical robust estimators are indices based on transition matrices (Cowell and Schluter, 1998). The quantiles have to been chosen such that all censored individuals lie in one quantile. As we do not have censoring problems, we can look at the earnings distribution in percentiles to give a relative distribution of earnings in all periods. Percentiles are clearly interpretable and give a very close approximation to the income ranking[5].

3. Earnings mobility and volatility

We define mobility $M_{t_i t_j}$ as the number of percentiles pc_{t_i} a worker is jumping between t_i and t_j. Theoretically, mobility can vary between -99 and +99 if the worker jumps from the top position to the bottom or vice versa.

$$M_{t_i t_j} = pc_{t_j} - pc_{t_i}$$

Figure 1 shows the distribution of earnings mobility in the population of Upper Austria in a typical year (1997-1998, Panel a) and for the whole period 1994-2001 in Panel b. We can see that earnings mobility from year to year is rather modest with a standard deviation of 9.5. A comparison with the eight year period in Panel b shows quite clearly, that a large amount of earnings mobility is not transitory: the distribution of medium-term earnings mobility is much more spread out with a standard deviation of 19.5. A fair amount of people move up or down over several periods.

Earnings risk is measured as the volatility of the yearly income positions. A simple indicator is the coefficient of variation $CoV_{94,01}$ in terms of changes in income positions: the

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[4] This 'consistent' sample approach is preferable in our case, because we want to study the difference in position between our starting and the end period, as well as the volatility in-between. A 'maximum' sample approach – as used by some authors (Buchinsky and Hunt, 1999) – uses instead all persons, who report positive earnings for at least two consecutive years. An alternative would be to include periods with zero earnings, which is rarely done in mobility analysis.

[5] In some cases, individuals had the same earnings on the border line; in these rare cases (maximum of 52 persons) we classified all individuals with the same earnings in the same percentile.

sum of *absolute* position changes over the whole period divided by *the absolute value of income mobility* – as defined above.[6] Figure 2 shows this indicator for income volatility over the period 1994-2001.

$$CoV_{94,01} = \frac{1 + \sum_{t=1995}^{2001} abs(pc_t - pc_{t-1})}{1 + M_{94,01}}$$

Due to this definition, income volatility cannot be lower than 1, therefore we use a logarithmic transformation for our estimation. The next task is to relate these indicators to personal characteristics of the population. Although the variable mobility is defined in discrete steps – jumping above or below a percentile border – its support is reasonably large to allow using simple OLS methods. Alternatives like ordered probit or interval regression would be infeasible given the large number of different steps.

3.1. Earnings mobility

Table 1 reports results for upward mobility between 1994 and 2001. We relate income mobility to personal characteristics of the worker as of 1994 (Column 2), in Column 1 also some other variables are included which mirror the labor market behavior of the worker in the period, like switching jobs, etc. Adding these possibly endogenous variables to the regression does not change the outcome as compared to Column 2.

The regression coefficients can easily be interpreted as the number of deciles a person is jumping over. The most important predictors for upward mobility are age, education and the status at the beginning of the period. Workers below 30 move up 12 percentiles as compared to workers with an age of 50 and above. As we are investigating relative positions, those already in the fourth quartile in 1994 face more difficulties to climb up the career even further: Those in the first quartile can recoup 22 percentiles, those in the second still 11 percentiles. Whereas persons with an academic education have a harder time to move up – possibly due to their high starting positions – those in white-collar jobs face much better career aspects as compared to blue-collar workers; they move up 9 percentiles more. Looking at the industry the worker has been in at the beginning of the period, we see that most

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[6] We add 1 to both nominator and denominator to avoid problems with persons who end up in the same position

favorable for advancement are 'further services', followed by the manufacturing sector; with the public sector as the least favorable. Likewise, workers in firms with more than 100 employees, face better prospects: they move up 4 percentiles more as compared to very small firms. Interestingly, the fact that workers have moved regionally or changed industry is not associated with changes in relative economic position. Those who have changed jobs more often seem to do worse in terms of advancement.

In Table 2 we look at asymmetries in upward or downward mobility by simply splitting our sample into those experiencing a relative income improvement over the period 1994-2001 and those experiencing a relative decline. To facilitate interpretation we coded both upward and downward mobility in absolute terms. The most remarkable difference between upward and downward mobility concerns the relation to the number of jobs held. Whereas having more than one job increases the chances to move up the positional ladder, it also increases the chances to move downwards.[7] Changing jobs more often can have very different consequences: the most obvious interpretation is that workers, who experienced a relative advancement in their economic position over the whole period had mostly voluntary quits, whereas other workers experiencing downward mobility have suffered some involuntary job changes related to dismissals. Likewise, workers who changed industry face larger relative losses.

The other characteristics have relatively little differential relation to upward or downward mobility with the exception of age, industry and previous position. Upward mobility is higher for workers below 30 only as compared to workers above 30; whereas workers up to the age of 49 face pretty much the same risk of downward mobility, only those elder than 50 face a higher risk. In terms of industries, workers in the public sector, education and health have the least advancement chances, whereas on the downward side, public sector workers are not much different from the rest. Finally, concerning the starting position we see that differentials with respect to starting positions on the upward side are twice as high as those on the downward side, which can be interpreted as an asymmetry in terms of persistence: those who start out very low have a relatively high chance to work themselves upwards, whereas the risk to tumble down – once you started from high above – is comparatively lower.

3.2. Earnings volatility

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at the beginning and at the end of our observation period.

In Table 3 we present evidence on earnings volatility to capture the more negative side of earnings mobility. We find that workers between 30 and 39 face the most volatile earnings positions. Whereas white-collar workers can enjoy more stable earnings, those with academic education face higher volatility. It is not very surprising that workers who changed jobs more often, experience higher earnings volatility over time. Moreover, those who started in larger firms, again, face higher volatility.

Income earners in lowest three quartiles face higher income volatility as compared to those in the highest earnings position. This is remarkable and points towards some problems for low-income earners: Variability of earnings over time will be less of a problem i) if it is expected and ii) if there are borrowing opportunities to smoothen the consumption stream over the period under consideration. What kind of workers will have higher certainty about their future earnings? A first guess is workers in the public sector, who face strict and pre-determined pay scales and do not face unemployment risk. Moreover, those who change jobs less, because they do not have to cope with completely different firm pay and career scales, and finally those in the private sector, who face a lower risk of unemployment, because then they do not have to change employers. In terms of borrowing constraints, those with less collateral, less education and a lower current income will have a higher chance to be credit restrained. These considerations combined point towards bigger problems with earnings volatility for low-income earners: they have a higher volatility of earnings, their development of earnings in the future is less foreseeable and their risk to be credit constrained is higher.

4. Conclusions

Income mobility has two facets: changes in relative position over time and the volatility of earnings over a period of time. Most studies look at the chances for relative advancement only and see higher mobility as an equilibrating factor in society: more mobile societies are to be preferred because there is a higher chance that unequal starting positions get washed out over time. The second aspect of mobility, the volatility of earnings is often overlooked. In particular for low income groups, who might have less borrowing opportunities and whose earnings changes might be less predictable as compared to high income groups, earnings volatility might be of considerable importance.

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[7] This is not the case for workers with more than 10 jobs.

Using tax authority data for Austria we see that earnings mobility is related to the starting position of the worker: the higher up the initial position, the more difficult is further professional advancement. Workers in bigger firms have advantages as well as those in white-collar positions. Moreover, there are clear indications that changing jobs more often can lead to upward or downward mobility, if the corresponding changes occurred voluntarily or involuntarily, respectively. In terms of the volatility of earnings positions over time the main result concerns the initial income position: those in the lowest three quartiles of the earnings distribution have to face the highest volatility of earnings over time, which is a problem from a social point of view.

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Table 1: Change in Relative Economic Position (1994 - 2001)

	1 *)		2 *)	
Wage quartile in 1994 (base: fourth)				
first	22.252	(0.156)	21.528	(0.155)
second	11.114	(0.148)	10.915	(0.148)
third	3.131	(0.137)	3.101	(0.137)
Academic education	-6.137	(0.200)	-6.020	(0.199)
Age (base: 50 -)				
- 29	12.369	(0.222)	11.922	(0.220)
30 - 39	6.468	(0.214)	6.241	(0.214)
40 - 49	3.197	(0.218)	3.083	(0.219)
Number of jobs (base: 1)				
2	0.993	(0.125)		
3 – 5	0.025	(0.143)		
6 – 8	-2.103	(0.205)		
9 – 12	-3.121	(0.298)		
>= 13	-5.394	(0.406)		
Firm size (base: 1 - 10 employees)				
11 – 100	1.642	(0.179)	1.633	(0.179)
> 100	4.285	(0.173)	4.319	(0.173)
Commuter (0,1)	0.069	(0.099)	-0.027	(0.099)
White collar worker (0,1)	9.455	(0.114)	9.823	(0.113)
Small city (0,1)	-1.135	(0.111)	-0.879	(0.111)
Industry (base: manufacturing)				
primary sector	1.707	(0.250)	1.691	(0.249)
construction and transport	-1.941	(0.130)	-2.439	(0.122)
trade and tourism	-2.540	(0.147)	-2.730	(0.137)
further services	1.884	(0.230)	1.637	(0.161)
education, health and other				
public sector	-4.817	(0.171)	-4.662	(0.165)
# changes in industry	-0.617	(0.061)		
# regional moves	-0.033	(0.006)		
Employment change in industry				
of origin from 1994 – 2001	-0.001	(0.002)		
R^2 adj.	0.247		0.241	
Mean of LHS	0,00		0,00	
N	152053		152053	

*) Standard errors in parenthesis

Table 2: Upward versus Downward Mobility (in absolute terms)

	Upward *)		Downward *)	
Wage quartile in 1994 (base: fourth)				
first	19.009	(0.199)	-9.969	(0.155)
second	14.982	(0.191)	-1.735	(0.137)
third	8.133	(0.180)	3.031	(0.125)
Academic education	-3.125	(0.225)	4.366	(0.229)
Age (base: 50 -)				
- 29	4.136	(0.430)	-3.143	(0.189)
30 - 39	0.343	(0.427)	-3.196	(0.175)
40 - 49	-0.688	(0.440)	-2.504	(0.176)
Number of jobs (base: 1)				
2	3.457	(0.147)	3.305	(0.123)
3 – 5	4.358	(0.167)	5.247	(0.140)
6 – 8	2.968	(0.248)	5.056	(0.193)
9 – 12	0.615	(0.355)	3.731	(0.284)
>= 13	-2.925	(0.489)	0.964	(0.390)
Firm size (base: 1 - 10 employees)				
11 – 100	0.982	(0.216)	-0.749	(0.170)
>= 101	2.327	(0.210)	-1.837	(0.164)
Commuter (0,1)	0.117	(0.119)	0.142	(0.094)
White collar worker (0,1)	5.961	(0.132)	-3.120	(0.115)
Small city (0,1)	-0.920	(0.130)	0.165	(0.108)
Industry (base: manufacturing)				
primary sector	-0.541	(0.294)	-2.383	(0.249)
construction and transport	-1.337	(0.160)	-0.243	(0.122)
trade and tourism	-1.760	(0.172)	0.719	(0.143)
further services	0.530	(0.261)	-2.029	(0.237)
education, health and other public sector	-4.239	(0.215)	0.044	(0.162)
# changes in industry	0.961	(0.070)	2.213	(0.060)
# regional moves	-0.008	(0.007)	0.022	(0.005)
Employment change in industry of origin from 1994 - 2001	0.004	(0.002)	0.006	(0.002)
R^2 adj.	0.261		0.184	
Mean of LHS	15,62		-12,82	
N	65200		79460	

*) Standard errors in parenthesis

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Table 3: Variability of Relative Position (ln(Coefficient of Variation), 1994-2001)

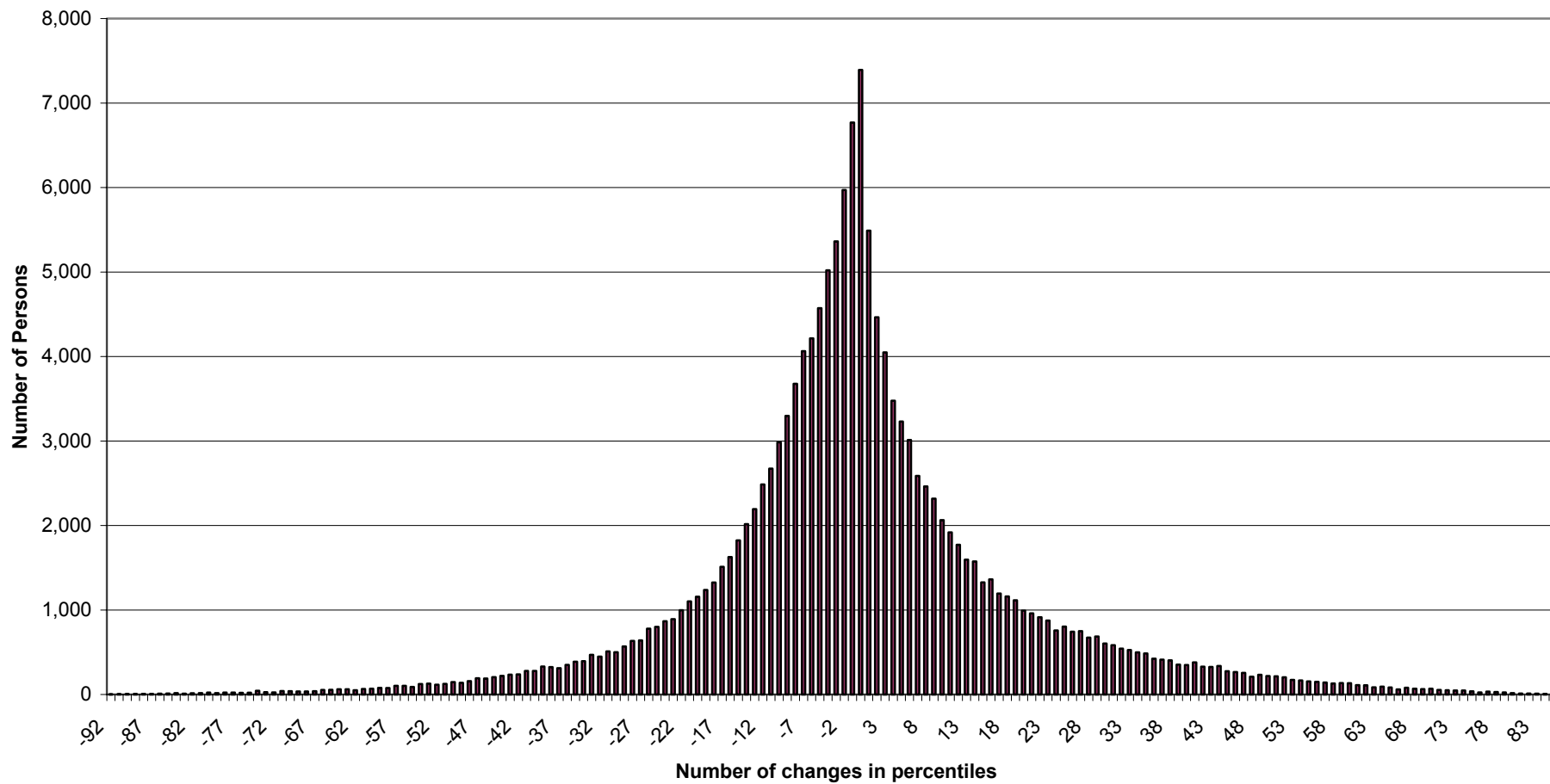|	1		2	
Wage quartile in 1994 (base: fourth)				
first	0.048	(0.007)	0.109	(0.008)
second	0.127	(0.007)	0.147	(0.007)
third	0.098	(0.006)	0.105	(0.007)
Academic education	0.173	(0.010)	0.148	(0.010)
Age (base: 50 -)				
- 29	0.148	(0.011)	0.198	(0.011)
30 - 39	0.244	(0.011)	0.269	(0.011)
40 - 49	0.178	(0.011)	0.189	(0.011)
Number of jobs (base: 1)				
2	0.001	(0.006)		
3 – 5	0.088	(0.007)		
6 – 8	0.289	(0.010)		
9 – 12	0.377	(0.015)		
>= 13	0.338	(0.020)		
Firm size (base: 1 - 10 employees)				
11 – 100	0.062	(0.009)	0.051	(0.009)
>= 101	0.116	(0.008)	0.106	(0.009)
Commuter (0,1)	0.019	(0.005)	0.028	(0.004)
White collar worker (0,1)	-0.176	(0.006)	-0.212	(0.006)
Small city (0,1)	0.007	(0.005)	-0.009	(0.005)
Industry (base: manufacturing)				
primary sector	-0.074	(0.012)	-0.054	(0.012)
construction and transport	0.034	(0.006)	0.097	(0.006)
Trade and tourism	-0.043	(0.007)	-0.016	(0.007)
further services	-0.063	(0.011	-.001	(0.008)
education, health and other public sector	-0.040	(0.008)	-0.038	(0.008)
# changes in industry	0.026	(0.003)		
# regional moves	0.001	(0.001)		
Employment change in industry of origin from 1994 – 2001	0.0006	(0.0001		
R^2 adj.		0.061		0.044
Mean of LHS		1,18		
N		152053		152053

Figure 1a: Earnings Mobility 1998-1999
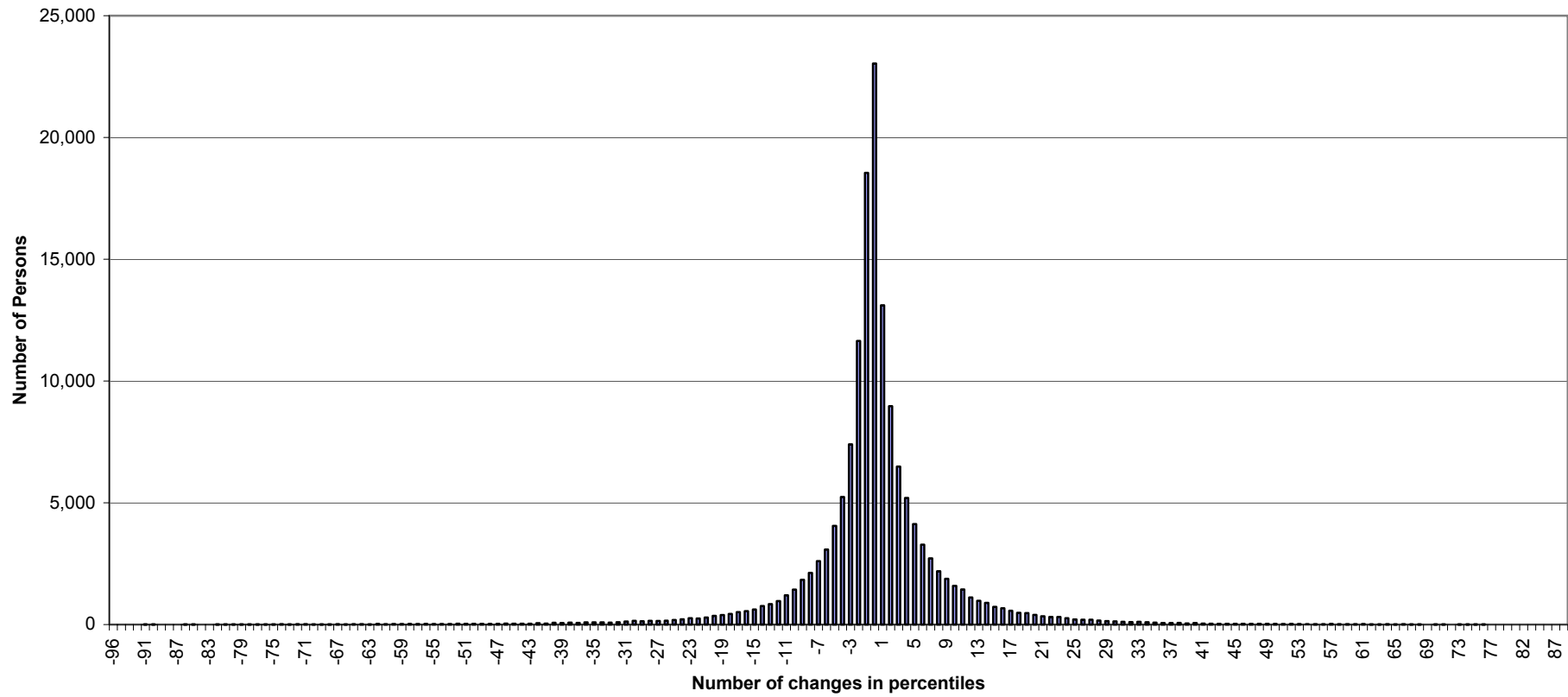
Figure 1b: Earnings Mobility 1994-2001

Figure 2: ln(Coefficient of Variation)