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German male income volatility 1984 to 2008: Trends in permanent and transitory income components and the role of the welfare state

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German male income volatility 1984 to 2008:
Trends in permanent and transitory income components and the role of the welfare state

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Abstract. Deploying data from the German Socio-Economic Panel (GSOEP) we analyze the variability of individual earnings and equivalent household income. Permanent and transitory variances of male income over the period 1984-2008 are estimated for Old German Laender in order to determine their importance to income dynamics. To uncover the role of the welfare state in smoothening earnings shocks we compute different income concepts reaching from gross earnings to net equivalent household income. We find evidence that the overall inequality of earnings in Germany has been rising throughout the period due to both higher permanent inequality and higher volatility. However, taking the welfare state and its institutions into account, we find that net household income has remained fairly stable.

Keywords: Earnings Inequality, Permanent Income Inequality, Transitory Income Volatility, Earnings Dynamics, Safety Net, Transfer Payments

JEL classification: D31, D63, I38, J31

1 Introduction

The crisis of the welfare state has been widely discussed in the last two decades. Facing budget constraints and globalization, governments in many industrialized countries have retrenched social policies since the 1980s. Following the general perception that globalization, deregulation, and technological change contributed to fostering competitive pressures and risks for employees, it has often been argued that these result in growing income uncertainty. This higher income uncertainty may in turn increase risk faced by individuals or households, leading to welfare loss, as it is generally assumed that people are risk-averse.[1]

The evolution of income volatility and economic inequality, especially for the U.S., United Kingdom and Canada, has been in the focus of empirical researchers since the seminal paper by Gottschalk and Moffitt (1994). The literature has produced evidence of a trend of rising income inequality in these countries.[2] Most contributions decompose overall income inequality into a permanent component, mirroring the disparity of permanent incomes, and a transitory component, covering short-term volatility, to uncover the driving force behind rising total inequality.

Few cross-national studies have included Germany,[3] but for the most part, research on the German case is scarce and often restricted to labor market earnings. Myck et al. (2008) use gross earnings of full-time employees between 1994 and 2006. They conclude that the permanent component's share grew during the 1990s, but from 2000 on they identify the transitory component as the driving force behind the increasing cross-sectional earnings inequality in Germany.

The extensive redistributive intervention of a welfare state combined with a safety-net provided by families can contribute to smooth the income variation and stabilize consumption. In the face of rising earnings volatility the stabilizing intervention may lead to a Pareto improvement and is hence efficiency enhancing. Scheve and Slaughter (2004) find empirical evidence that people working in more globalized sectors 'feel' more economically insecure. However, to verify whether this 'feeling' of growing insecurity is justified and to estimate the extent to which labor market uncertainty really influences the individuals' economic situation, stabilizing factors such as taxes, public transfers and household income pooling should also be considered.

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[1] See for example Hacker and Jacobs (2008) or Gosselin (2008).
[2] See Dynarski and Gruber (1997), Haider (2001), Baker and Solon (2003), Dynan et al. (2008), Shin and Solon (2008), Nichols and Zimmerman (2008).
[3] See Van Kerm (2003), Daly and Valletta (2008).

On an individual level, the difference between gross and net earnings reflects the stabilizing effect of progressive taxation and the obligatory social security system (Fabig, 1999). Insurance payments received from the social security system, e.g. unemployment benefits, tend to smooth the individual income volatility furthermore. Ultimately, the country-specific tax and transfer system determines the way in which a given shock to individual gross income translates into a change in individual disposable income as Dolls et al. (2009) argue. They find that the German taxes and social security contributions avert approximately 58 Percent of an income shock, whereas in the U.S. the figure is only 32 percent. Their results are consistent with those of Chen (2009), who confirms that the more progressive German tax system offsets earnings variations sizably compared to the U.S. and Great Britain.

If a household encompasses more than one person, income pooling occurs to cushion individual income shocks. Moreover, households may be entitled to public transfers such as social welfare or child benefits. Thus it is possible to assess whether and to what extent the intervention of the welfare state actually reduces the variability of market incomes. Dynan et al. (2008) find that households' labor earnings, household incomes and transfer payments became more volatile in the U.S. between 1967 and 2004. They documented that rising instability of market income could only partly be buffered by transfer payments. Dynarski and Gruber (1997) find evidence for the U.S. that, in addition to the institutions of the welfare state, families might offset earnings variations and smooth their consumption. Biewen (2005) looks at the covariance structure of net equivalent household income in Germany between 1990 and 1998. He finds that more than half of the income inequality is permanent, but transitory income shocks gained in size over the 1990s relative to a fairly stable permanent component. Whether these transitory income shocks turned out to be smaller than preceding labor market earnings shocks is still an unanswered question. The tax and transfer system as well as income pooling could contribute to such an effect. This study aims at closing this gap. Dynamics of different income concepts between 1984 and 2008 are analyzed, taking the different dimensions of the welfare state's intervention into account.

As mentioned above, many governments opted for a leaner welfare state model, as in the case of Germany since the change of government in 1982. There exist numerous works on the evolution of income inequality in Germany. Some include the role of the welfare state. All but two studies mentioned in the following are based on GSOEP data. Therefore, we refrain from mentioning the data base and only indicate when data com from a source other than GSOEP. A rising cross-sectional wage inequality in Germany as documented by Gernandt and Pfeiffer (2007) and Müller and Steiner (2008) could have resulted in higher inequality of net

household income, indicating that the inequality-reducing effect of the redistributing German tax and transfer system decreased in the last three decades.

Peichl et al. (2010) indeed find a declining distributive impact of the German tax and transfer system between 1991 and 2007. In contrast, Bach et al. (2009) find an increasing market income inequality against an almost constant net income inequality between 1992 and 2003 using a merged data base of GSOEP and Income Tax Return data. Fuchs-Schündeln et al. (2010) also observe that the inequality-reducing effect of the tax and transfer system becomes more pronounced between 1984 and 2004. Grabka and Wagner (1999) document a rise in pre-government income inequality against a slightly falling post-government income inequality opposite between 1990 and 1997. The second poverty and wealth report of the German Federal Government (Bundesregierung, 2005) finds a fairly stable distribution of net income against an increasingly unequal distribution of gross earnings between 1998 and 2003 using the Income and Expenditure Survey.

To discover the extent to which these changes in inequality are the result of changes in the distribution of permanent income or the result of changes in the stability of income we compute permanent and transitory variances of male income over the period 1984-2008 for Old German Laender. Furthermore, variances are estimated for five different income concepts ranging from gross earnings to net household income to uncover the role of the welfare state in smoothening labor market shocks. Estimating variances for certain demographic subgroups allows further insight if, for example, younger age groups, singles or lower income quartiles are more affected by income volatility.

The remainder of this article is structured as follows: In section 2 the conceptual framework of permanent and transitory components of overall inequality is presented. The data deployed in the study is a subsample of the GSOEP. The characteristic of the sample are described in section 3. In section 4 the estimation results are presented and interpreted. Section 5 draws a conclusion of the main results.

2 Methodological considerations

To uncover the driving force behind rising inequality it is common among researchers to split the overall income inequality into a permanent and a transitory component. We adjust the approach introduced by Gottschalk and Moffitt (1994) by calculating permanent and transitory variance as a moving average centered on a reference year. This approach is very appealing for its data requirements in terms of panel structure. In order to derive the measures

needed, only two individual observations are necessary and, thus, sample size is fairly large compared to more technically sophisticated studies utilizing the auto-covariance matrix of earnings (for Germany see Biewen, 2005, and Myck et al. 2008). In addition, Moffitt and Gottschalk (2008) demonstrate that the applied method approximately yields the same time series patterns.[4]

Consider $i = 1,...,N$ individuals with real earnings over $t = 1,...,T$ periods. First, we want to adjust earnings for life-cycle effects. Therefore, all individual log earnings within a five-year window are regressed on age and age squared and a common age earnings profile is identified. The residuals from this regression form the basis of our following analysis. Our income measure $y_{i,t}$ for individual i in period t is, as a consequence, the deviation of the individual's earnings from the common age earnings profile (Gottschalk and Moffitt, 1994). Formally, we divide the individual earnings measure $y_{i,t}$ into a permanent $\bar{y}_{i,t}$ and a transitory component $v_{i,t}$:

$$(1) \qquad y_{i,t} = \bar{y}_{i,t} + v_{i,t} \,,$$

where the permanent component is defined as the average earnings realized over a five-year window centered around t. Taking into account that individual earnings are not necessarily reported over the whole five-year window centered around t but for $K_{i,t}$ of the five years, permanent earnings are calculated as $\bar{y}_{i,t} = \dfrac{1}{K_{i,t}} \sum_{s=t-2}^{t+2} y_{i,s}$, with $K_{i,t} \in [2,5]$. In addition, the transitory component is the deviation of annual earnings measure from permanent earnings, $v_{i,t} = y_{i,t} - \bar{y}_{i,t}$. Based on this, the transitory variance of individual i is calculated as the variance of transitory earnings in the five-year window centered around t:

$$(2) \qquad Var(v_{i,t}) = \frac{1}{K_{i,t} - 1} \sum_{s=t-2}^{t+2} (y_{i,s} - \bar{y}_{i,t})^2$$

Averaging (2) over all N individuals yields the overall sample transitory variance in t:

$$(3) \qquad \sigma_{v,t}^2 = \frac{1}{N} \sum_{i=1}^{N} \left[\frac{1}{K_{i,t} - 1} \sum_{s=t-2}^{t+2} (y_{i,s} - \bar{y}_{i,t})^2 \right]$$

In a final step, sample permanent variance of earnings is derived. We derive mean permanent

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[4] However, some drawbacks remain. As Gottschalk and Moffitt (2009) point out, exact turning points in time series of transitory earnings cannot be derived and subtle dynamic processes in earnings such as serial correlation, random walks or random growth are not treated correctly.

earnings as $\bar{y}_t = \frac{1}{N}\sum_{i=1}^{N}\bar{y}_{i,t}$ and the average number of observations over all individuals in the a

respective five-year window, $\bar{K}_t = \frac{1}{N}\sum_{i=1}^{N}K_{i,t}$. From here, the permanent variance is calculated:

$$(4) \qquad \sigma_\mu^2 = \frac{1}{N-1}\sum_{i=1}^{N}(\bar{y}_{i,t}-\bar{y}_t)^2 - \frac{\sigma_{v,t}^2}{\bar{K}_t}$$

In sum, we measure the growth of income volatility comparing the variances of the components as the change between one period and the subsequent period, i.e. the growth rate of the variances. The variance of the permanent component can be seen as the permanent income inequality showing the persistent dispersion of income within the population. The variance of the transitory component can be interpreted as the instability of the individual earnings profile.

3 Data

The analysis is based on a subsample from the GSOEP for the years 1984 to 2008. The GSOEP is a representative panel study containing individual and household data in Germany from 1984 onwards. After German reunification in 1990 the study was expanded to the New German Laender. All household members are interviewed individually once they reach the age of 16. The sample design ensures representativeness by oversampling special subpopulations. These include subsamples of guest workers from 1984 onwards, immigrants starting in 1994 and high income households from 2002 on.[5]

The GSOEP provides several income figures both monthly and annually. However, not all monthly income concepts are also available as annual statistics, and vice versa. Monthly incomes refer to the survey year whereas annual incomes pertain to the preceding year.

Table 1 depicts the income concepts considered, reflecting different scopes of government intervention: (1), (4) gross earnings reveal the "pure" labor market outcome, (5) adjusted gross earnings including unemployment benefits signal the stabilizing effect of the individual's unemployment insurance, (2) net earnings reflect the volatility-reducing effect of a progressive tax system[6] and social security contributions, (6) gross household income reveals stabilizing effects of income pooling within households and (3), (7) net household income allows conclusions about the equalizing and stabilizing role of social transfers beyond

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[5] See Haisken-DeNew and Frick (2005), Frick (2006) and Wagner et al. (2007) for further details.
[6] Given the possibility of joint income tax assessments for couples in Germany, the progressivity of the tax system depends on the individual household situation.

household income pooling. Due to survey methods, monthly incomes date back to the year the interview took place and annual incomes to the previous year. Annual incomes are divided by twelve to allow for comparisons between variances of monthly and annual incomes. All earnings and incomes are put into 2005 CPI Euro.[7]

<div align="center">Table 1. Income Concepts in the GSOEP</div>

Income concept	Description	Monthly	Annual
Incomes at individual level			
Gross earnings	Gross labor market earnings	(1)[a]	(4)
Adjusted gross earnings	Gross earnings + unemployment benefits		(5)
Net earnings	Gross labor market earnings – income taxes – social security contributions	(2)	
Incomes at household level			
Gross household income	Equivalent[b] household income before taxes and public transfers including labor earnings, asset income, private retirement and private transfers		(6)
Net household income	Gross household income – taxes[c] + public transfers[d], equivalized[b]	(3)	(7)

<div align="center">Source: German Socio-Economic Panel (GSOEP)</div>

Notes: a. (#) denotes number of income concept if income is available on monthly or respective annual basis.
b. Equivalent household income is derived using *OECD modified equivalence scale* that assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.
c. Taxes include income taxes and social security contributions for health, unemployment, retirement insurance and nursing home insurance taxes. (Grabka, 2009, p.42)
d. Public transfers include housing allowances, child benefits, subsistence assistance from the Social Welfare Authority, special circumstances benefits from the Social Welfare Authority, government student assistance, maternity benefits, unemployment benefits, unemployment assistance, and unemployment subsistence allowance. (Grabka, 2009, p.42)

We use five-year windows ranging from 1984 to 2008 for monthly incomes and from 1983 to 2007 for annual incomes to identify changes in the variances. Each five-year period is centered on the middle year of the window. That is, 1986 denotes the base year of the five-year window 1984-1988. West German males aged between 20 and 59 and in the labor force serve as the basis for the analysis. Women, students and severely disabled persons are excluded in order to avoid distortions. The high income sample starting only in 2002 is excluded as well to avoid wrongly attributing higher recent variances to the larger number of high incomes in the sample. Single observations with zero earnings are only included if they report receiving unemployment benefits; otherwise they are dropped. Men for whom the information on at least one income concept is missing are eliminated, as are men who participated in the GSOEP only once within a five-year period. In addition, the top and bottom one percent of the income distribution are dropped.[8] On average, individuals

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[7] Variances were also calculated using growth-adjusted incomes to check the robustness of the variances to income growth. The resulting variances are slightly lower when compared to variances based on price-adjusted incomes, but overall the results exhibit the same trends.
[8] "Trimming" data is common practice in the literature, see for example Gottschalk and Moffitt (2009).

participate four years of each five-year period and eight years over the entire time horizon.

We subdivide the population into several demographic groups to control for differences arising from the level of education, income class age and household type. We define three educational levels as schooling, schooling plus vocational qualification and university degree. The second category is income quartiles. The third grouping is by age: 20-24, 25-29, 30-34, 35-39, 40-44, 45-49 and 50-54, 55-59. Finally, three different household types are considered separately: singles, couples without children and couples with children. Education, age and household group sizes do not add up to the total number of males participating in a period because males could change groups within one period and thus could be counted twice. For example, they could be part of a younger age group in the beginning of the period and part of an older one at the end.

For selected base years, Table 2 depicts the sample description. Due to panel attrition, sample sizes decrease for the first three periods. In 1998 and 2000 additional samples were drawn for replacement, thus explaining the increased sample size in base years 2001 and 2006. Still, cell sizes are higher than in comparable studies with different data requirements.

Table 2. Sample Description for Selected Base Years

Group	Base Years				
	1986	1991	1996	2001	2006
Males	3732	3293	3007	5080	4361
Schooling	1018	933	734	944	548
Vocational qualification	2379	1994	1851	3576	2856
University	365	363	429	993	921
20-24 years	644	558	377	482	381
25-29 years	802	802	756	746	580
30-34 years	793	782	929	1245	803
35-39 years	780	677	761	1507	1200
40-44 years	851	659	613	1331	1340
45-49 years	802	580	463	936	982
50-54 years	694	696	463	846	879
55-59 years	411	430	365	544	579
Single	437	423	402	787	740
Couple w/o children	992	993	960	1486	1371
Couple w children	2382	1915	1717	2882	2331
Other	931	927	730	1101	1160

Source: German Socio-Economic Panel (GSOEP), own calculations

## 4 Income Volatility in West Germany

Figures 1 to 6 exhibits the general picture for the Old Laender. Transitory and permanent variances are calculated for each five-year time window starting with 1984-1988 and ending at 2004-2008. Variances are indicated by their central year, e.g. 1986 for the first period.

Trimming is based on the distributions of both monthly and annual net household income, i.e., observations in the highest and lowest percentile of the distribution of net household income were dropped.

Henceforth, permanent variance and permanent inequality are treated as synonymous, as are transitory variance, instability and volatility. Like other data sets, the GSOEP contains a significant amount of measurement error. Therefore, results must be interpreted with caution where appropriate.

Figures 1 to 2 depict the development of transitory and permanent variances of monthly and annual gross earnings, respectively. First we comment on transitory variances marked by black triangles and enclosed with dotted lines denoting Hall's (1994) bootstrap confidence intervals at the 95%-level.[9] Gross earnings become significantly more unstable between 1986 and 2006. Volatility remains relatively stable until 1998. Volatility of monthly earnings then increases significantly until 2004, whereas volatility of annual earnings increases only slightly. This finding suggests that recent deregulations of the German labor market resulted in higher earnings volatility for the German workforce.

Figure 1. Transitory and Permanent Variances of Real Monthly Gross Earnings
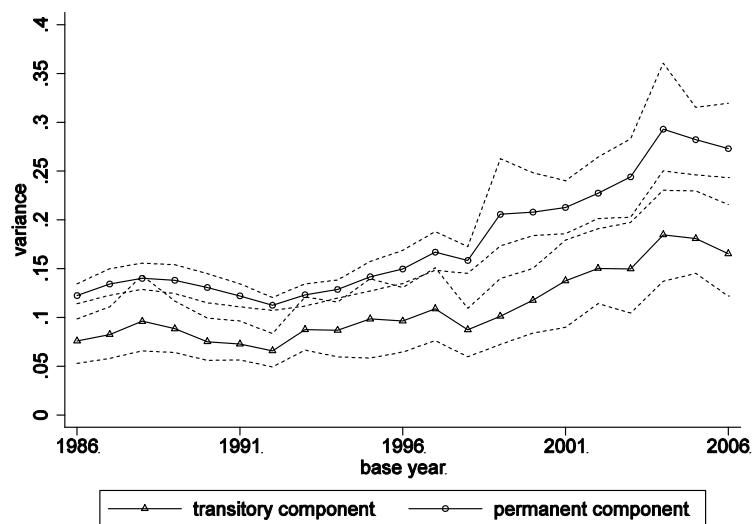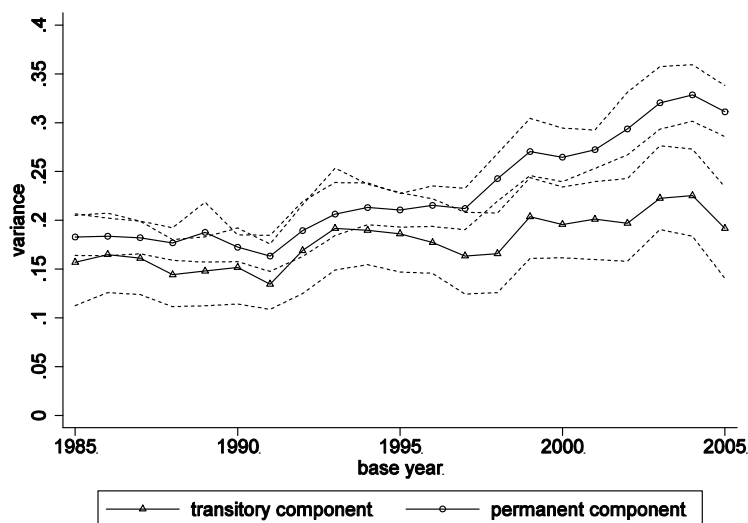

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to prices (in Euros) of 2005. Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year. Dotted lines denote Hall's bootstrap confidence intervals at 95%-level.

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[9] To indicate the statistical significance of the results, we use the bootstrap method (Mills and Zandvakili, 1997). We draw B random samples with replacement from all observations within a certain period, e.g. five years. Each bootstrap sample contains as many sampling units as the original sample. Moreover, we implement stratified bootstrap sampling to account for the survey design of the GSOEP. For a thorough discussion of the implications for bootstrapping inequality indices derived from panel data see Biewen (2002).

Figure 2. Transitory and Permanent Variances of Real Annual Gross Earnings

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

For permanent variances over time, we find that permanent inequality rises between 1984 and 2008 for both monthly and annual gross earnings. As seen for transitory variance, permanent variances rise after 1992 and again, even more sharply, after 1998. In contrast to the relative stability of annual earnings volatility, and to monthly earnings volatility, which in fact declines, permanent variances of both monthly and annual earnings continue to rise after 2004. Similar findings are reached by Daly and Valletta (2008). They document a continuous rise in permanent earnings inequality in West Germany through the 1980s and 1990s and an increase in earnings volatility between 1991 and 1999.

To address how much of the aforementioned rising cross-sectional inequality in Germany can be explained by transitory variances as opposed to permanent variances, we look at the overall variance as the sum of permanent and transitory variance. We find that the permanent variance of gross earnings is about 60 percent of total variance, as indicated in Figures 1 and 2. This implies that structural inequality is the main explanation for the cross-sectional earnings inequality, whereas volatility explains a smaller part. The contribution of permanent inequality to overall cross-sectional inequality is surprisingly homogeneous across OECD countries Sweden, Germany, the United Kingdom and the U.S. About two thirds of cross-sectional inequality is persistent, whereas one third is explained by transitory factors (OECD, 1996). Gottschalk and Moffitt (1994) also find that the permanent component of earnings in

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the U.S. amounts to about two thirds of cross-sectional variance between 1980 and 1987.

Concerning growth contribution of the transitory and permanent component, we find that both components doubled for gross earnings. Hence, half of the rising cross-sectional earnings inequality is to be attributed to transitory variances. This underlines the empirical importance of studying transitory variances (Gottschalk and Moffitt, 2009).

These trends are consistent with those identified by Myck et al. (2008). They confirm a rising cross-sectional variance of gross monthly earnings from 1999 caused by rising permanent inequality which peaks with a share of over 80 percent in 2001. They find that transitory variances gain in importance between 2001 and 2006.

Figures 3 to 6 depict the variances of different income concepts to uncover the role of taxes, public transfers and household income pooling. Transitory variances of monthly income are presented in Figure 3 and transitory variances of annual income in Figure 4. Figure 3 shows rising volatility of both gross and net monthly earnings. The difference between volatility of gross and net earnings reflects the individual's insurance against instability provided by a progressive tax system and social security contributions. In contrast, variances of net income remained fairly stable throughout the period under examination.
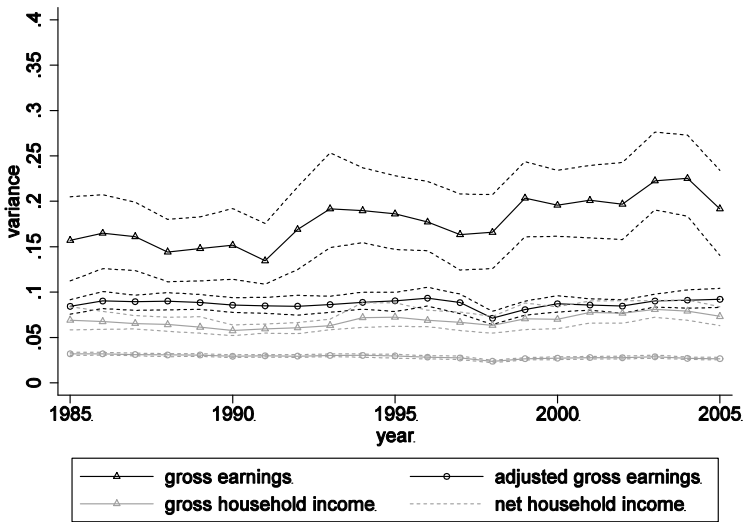
Figure 3. Transitory Variances of Real Monthly Income
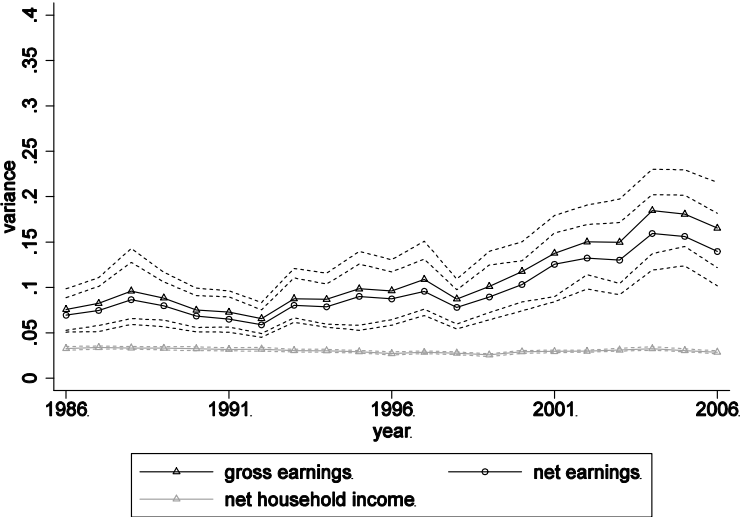
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Strikingly, volatility of annual gross earnings is also rising, as Figure 4 indicates, albeit on a trend less clear than that of monthly earnings. This finding is attributed to differences in accounting periods. Calculations based on annual earnings divided by twelve are more stable because extreme monthly earnings are likely to be evened out over a full year. Similar findings regarding different accounting periods are reported by Cantó et al. (2006) for poverty estimates for Spain. Comparing gross earnings and adjusted gross earnings suggests that unemployment benefits reduce volatility by about one half. But income pooling within the households (gross household income) combined with public transfers and taxes (net household income) induces an even larger reduction of instability. Overall, income pooling and government intervention reduce the volatility substantially. Before 1993, volatility of net household income is about one fifth the volatility of the labor market, after which the volatility difference between the two income concepts expands. Between 2004 and 2008 volatility of net household income is less than one seventh of gross earnings volatility. Van Kerm (2003) confirms that volatility levels of German net household income are low relative to other European countries. He compares volatility of annual net equivalent household income in Europe and finds West German income variability far below the reference country United Kingdom. Among 16 European countries, only Austria and Hungary have less income variability than West Germany. Ireland, Portugal and Spain reveal the most volatile income patterns.
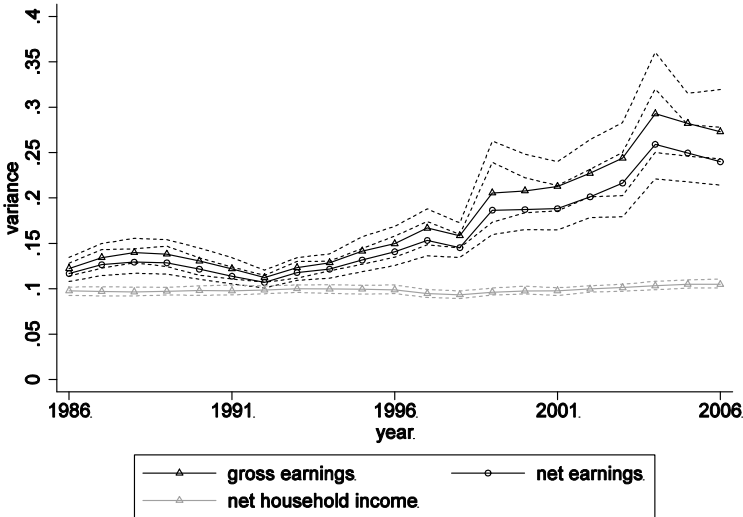
Figure 4. Transitory Variances of Real Annual Income

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Permanent variances of monthly income are depicted in Figure 5 and permanent variances of annual income in Figure 6. Permanent inequality of gross and net monthly earnings is clearly rising. With regard to annual income, we find that neither unemployment benefits nor household income pooling lead to a considerable reduction of permanent inequality. The increase in permanent inequality starting in 1998, when it demonstrates a sharp rise, coincides with macroeconomic growth accompanied by stagnating real wages. As Bach et al. (2009) document, in this period income growth is concentrated in the upper decile of the income distribution, median income is found to be declining and average income to be constant. But government intervention successfully contributes to evening out income differences: permanent inequality of both monthly and annual net household income remains fairly stable between 1984 and 2008.

Figure 5. Permanent Variances of Real Monthly Income

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Figure 6. Permanent Variances of Real Annual Income
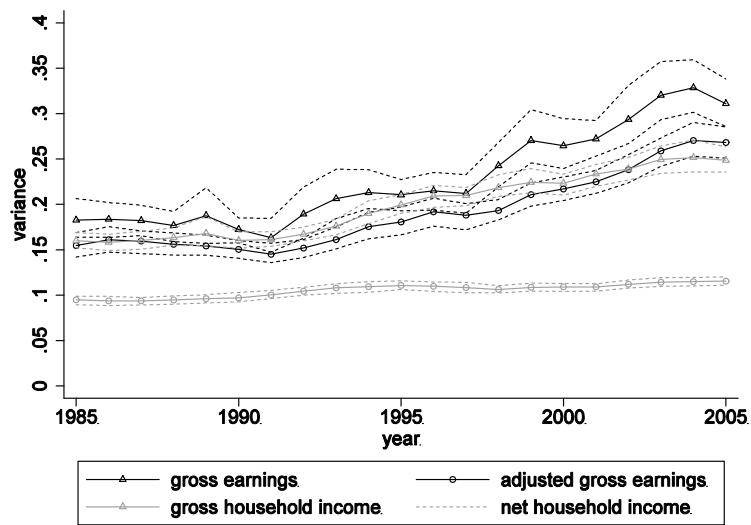
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Figures 7 and 8 complete the picture. Contrary to claims of rising labor market insecurity and welfare state retrenchment the German welfare state still reduces labor market volatility and permanent inequality. Estimation based on monthly and annual incomes both lead to the same conclusion for both transitory and permanent variances. Households were protected from experiencing the full force of both rising instability of the labor markets and growing permanent earnings differentials. Taxes, transfers and household income pooling buffer rising earnings volatility and rising permanent earnings inequality. The buffering effect of income pooling in the U.S. is supported by Gottschalk and Moffitt (2009). The increase in instability of head-of-household earnings can be offset by spouses' earnings. In contrast to our results for Germany, however, they find that transfer income fostered rising instability of household income in the U.S. after reforms in the 1990s.

Keeping in mind that cross-sectional variance is the sum of transitory and permanent variance we find that about 77 percent of net household income inequality can be attributed to permanent differences. Figures 7 and 8 illustrate that this share has increased to 79 percent since the year 2000.

Biewen (2005) finds the average fraction of the permanent component of West German monthly net household income between 1990 and 1998 to be around 60 percent. Compared to earnings inequality, cross-sectional net household income inequality is attributed to a larger extent to permanent inequality. As shown above, 77 percent of cross-sectional variance of net

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household income can be attributed to permanent inequality in contrast to only 60 percent of cross-sectional variance of earnings. Hence, the share of transitory variance in overall inequality is lower for net household income than for initial earnings. This indicates that the German welfare state reduces volatility to a larger extent than it does reduce permanent inequality.

Figure 7. Transitory and Permanent Variances of Real Monthly Net Household Income
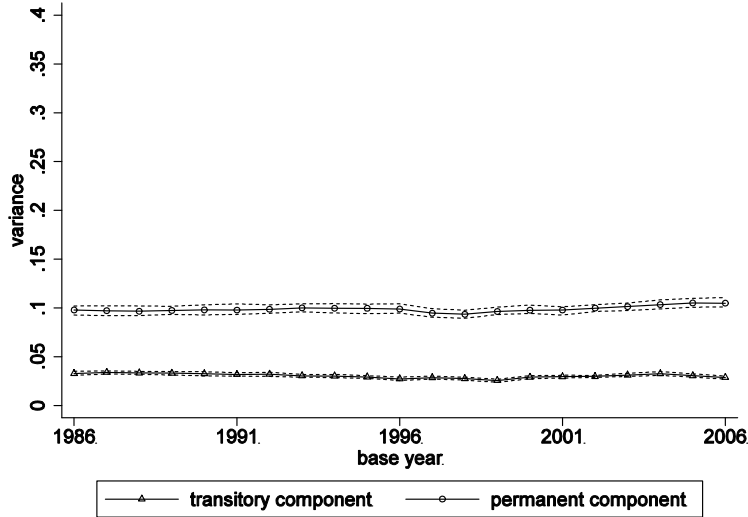
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Figure 8. Transitory and Permanent Variances of Real Annual Net Household Income
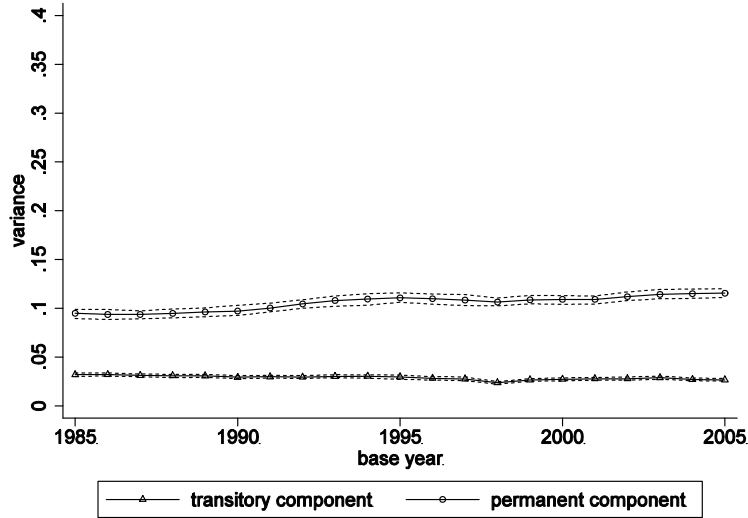
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Incomes are deflated by CPI to 2005 prices (in Euros). Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year.

Table 3 gives a detailed picture for selected base years, with stars indicating significant changes between five-year periods. The first panel gives point estimates for permanent and transitory variances of the three monthly income concepts, with differences between five-year periods given in percent. The sixth and the last column, respectively, indicate the overall trend between 1986 and 2006. Almost all changes over the full period under investigation are significant.

Comparing the growth of cross-sectional variances of annual gross and net household income, we find that inequality of gross household income increases far more. Hence, the overall inequality-reducing impact of the welfare states has indeed grown, confirming the results of Fuchs-Schündeln et al. (2010), but contradicting the finding of Peichl et al. (2010) that the redistributive impact declined between 1991 and 2007. Cross-sectional inequality of monthly net household remains stable in contrast to a rising inequality of monthly gross earnings, which confirms the results of Bach et al. (2009).

Table 3. Variances of Real Monthly and Annual Income

	Permanent variance[a] Percent change[b]						Transitory variance[a] Percent change[b]					
Base year	1986	1991	1996	2001	2006	1986-2006	1986	1991	1996	2001	2006	1986-2006
Monthly income												
Gross earnings	12.63	12.13	15.05	21.19	27.86		7.90	7.18	10.22	13.78	17.07	
		-4.0	*24.1**	*40.8**	*31.5**	*120.6**		*-9.0*	*42.3*	*34.8*	*23.9*	*116.1**
Net earnings	11.95	11.32	14.05	18.74	24.45		7.35	6.47	9.35	12.38	14.66	
		-5.3	*24.1**	*33.4**	*30.5**	*104.6**		*-11.9*	*44.4**	*32.4*	*18.5*	*99.5**
Net household income	9.79	9.84	9.82	9.86	10.65		3.36	3.30	2.81	3.01	2.95	
		0.5	*-0.2*	*0.5*	*8.1**	*8.8**		*-1.6*	*-15.1**	*7.2*	*-2.0*	*-12.2**
Base year	1985	1992	1995	2002	2005	1985-2005	1985	1992	1995	2002	2005	1985-2005
Annual income												
Gross earnings	17.84	18.63	20.89	27.20	33.70		15.40	14.73	18.02	21.16	22.71	
		4.4	*12.2*	*30.2**	*23.9**	*88.9**		*-4.4*	*22.3*	*17.5*	*7.3*	*47.5**
Adjusted gross earnings	15.54	15.13	18.32	21.69	27.34		8.60	8.77	9.22	8.76	9.24	
		-2.7	*21.1**	*18.4**	*26.1**	*75.9**		*2.1*	*5.0*	*-4.9*	*5.4*	*7.4*
Gross household income	16.01	16.76	20.15	22.50	25.78		6.79	5.64	7.24	7.14	8.10	
		4.7	*20.2**	*11.7**	*14.6**	*61.0**		*-16.7**	*28.4**	*-1.4*	*13.5*	*19.3*
Net household income	9.48	9.77	11.17	10.90	11.72		3.28	2.99	3.02	2.77	2.68	
		3.2	*14.3**	*-2.5*	*7.5**	*23.6**		*-8.8*	*1.2*	*-8.3**	*-3.5*	*-18.3**

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year. a. Incomes are deflated by CPI to 2005 prices (in Euros); b. "Percent Change" is measured as the difference between two subsequent five-year periods. Starred changes are significant at the 95%-level.

Our evidence thus far is not indicative of growing insecurity in Germany. Further disaggregation is necessary to investigate whether certain groups are indeed affected by growing insecurity, which has not become apparent considering average variances. This might be particularly plausible for lower income classes, singles and younger age groups.

Due to space limitations, we refrain from reporting results based on annual concepts for all subgroups except those for household types. Qualitatively, variances of both monthly and annual income give the same results.

4.1 Income Volatility and Income Classes

Ordering the population within a five-year period by their permanent income level, we find that the lowest quartile experiences substantially higher earnings volatility. Figure 9 shows that gross earnings volatility of the lowest quartile is twice two times as high as average volatility reported in Table 3, rising to three times as high after 1999. In contrast, earnings volatility of the second, third and fourth quartiles is only one half of average volatility, and only a quarter after 1999. This is indicative of an increasingly volatile low-wage sector due to reductions in social assistance and increased work incentives for recipients of unemployment benefits. On the other hand, high volatility might be caused by individuals at the start of their careers changing jobs more frequently. Interestingly, Gottschalk and Moffitt (2009) find the same pattern for the U.S. Transitory variances of the lowest quartile are two to three times higher than for those in the upper quartile.

Turning to the net household income, we find that volatility levels of the lowest quartile are still substantially reduced by the intervention of the welfare state despite the cut-back on social assistance. Altogether, the lowest and the highest quartiles experience more volatile net household incomes than do the two middle quartiles. Indeed, the source of income variation could differ between these income groups: while households in the upper quartile may be more likely to change jobs voluntarily or even to stop working for some time, households in the lowest quartile may more likely experience income volatility due to involuntary job loss. Van Kerm (2003) confirms that although West German net household incomes show low levels of volatility for most of the population, the poorest segments reveal exceptionally high fluctuations comparable to volatility levels in a low-wage country like Poland. In light of the liquidity constraints almost surely facing low income households, this result may be even more troubling (Gottschalk and Moffitt, 2009).

Figure 9. Transitory Variances of Real Monthly Income, Income Quartiles, 1984-2008
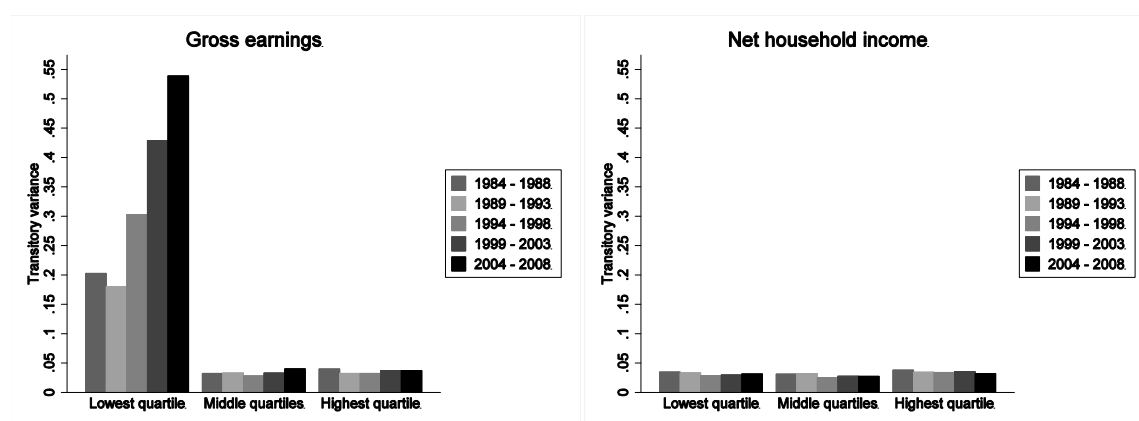
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Quartiles are based on permanent components of income. Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Year denotes the base year. Incomes are deflated by CPI to 2005 prices (in Euros).

4.2 Income Volatility and Age

As can be taken from Figures 10 and 11, the youngest age group considered – individuals 20 to 24 years old – shows the highest level of earnings instability and the highest dispersion of gross earnings throughout the period. On the whole, the correlation between age and both transitory and permanent variance of gross earnings appears to be u-shaped, confirming the pattern Mincer (1974) established. Younger persons experience higher earnings changes in the beginning of their career reflecting, among other things, a productive and voluntary search for better jobs. Following Topel and Ward (1992), two thirds of the job changes occur during the first ten years in the labor market. Results by Davia (2005) underline the attractiveness of more frequent job changes for young people. She finds that young workers who change employers on average achieve a higher wage than those who remain with the same employer. As young people typically earn wages in the lowest quartile, the instability of their earnings can explain a large share of the high volatility in the lowest income quartile. Employees leaving the labor market experience a change regarding their earnings profiles. Either they are more likely to experience periods of unemployment, or they retire. Consequently, they undergo negative income shocks.

Earnings dispersion is high among income earners starting their career due to the wide range of occupational choices. In the first years of work experience – the age group 25-29 – earnings are less dispersed. In older groups, the gap between the education-specific earnings profiles widens. Path dependencies of decisions made in the early stages of the career become apparent and hence, dispersion is increasing in age. As transitory changes become less

frequent over the life-cycle, permanent inequality gains importance in the overall cross-sectional inequality. Fuchs-Schündeln et al. (2010) also find this u-shaped pattern for lifetime earnings inequality.

The dispersion of net household income within the age groups is highest for the oldest age group. The relatively low permanent and transitory variance of net household income of the youngest age group suggests a strongly equalizing and stabilizing impact of social transfers and family support, particularly in light of the high variances of gross earnings of the youngest age group. The level of instability experienced by household members seems to be more or less equal, independent of individuals' ages.

Interestingly, income dispersion within age groups is well below the average income dispersion seen in Table 3, and is also below the dispersion of most of the education, household and income classes. Hence, age groups seem to be the most homogenous demographic income groups.
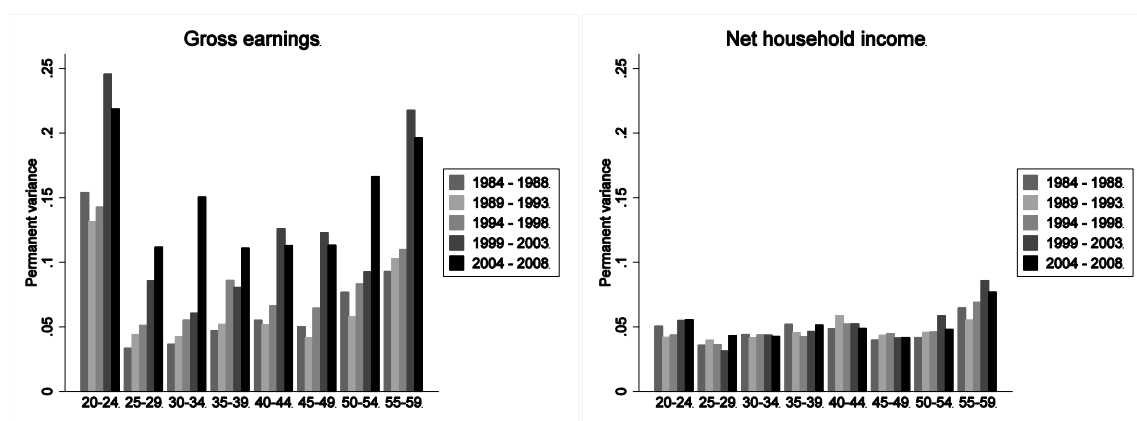
Figure 10. Transitory Variances of Real Monthly Income, Age Groups, 1984-2008
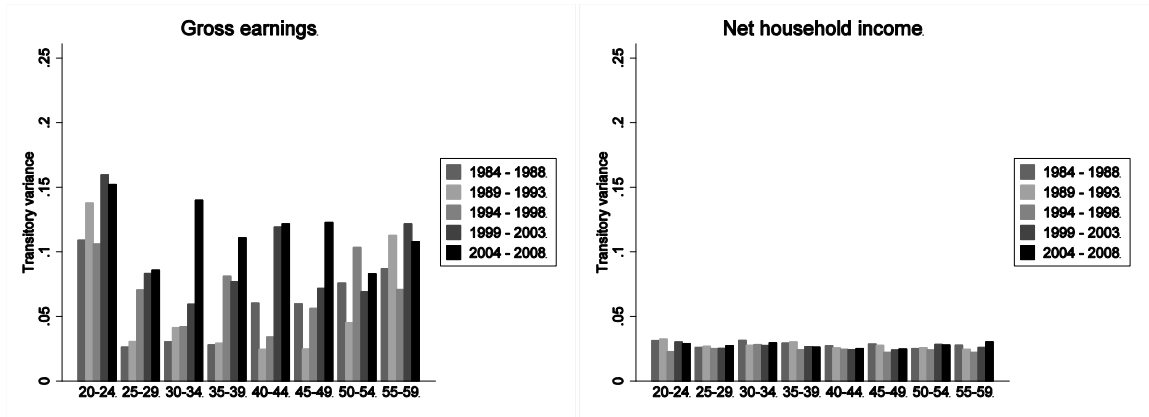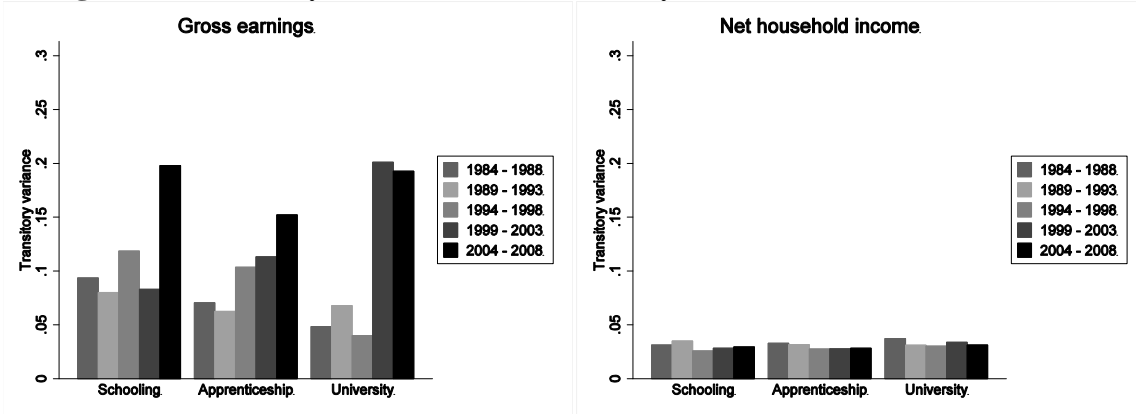

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Incomes are deflated by CPI to 2005 prices (in Euros).

Figure 11. Permanent Variances of Real Monthly Income, Age Groups, 1984-2008
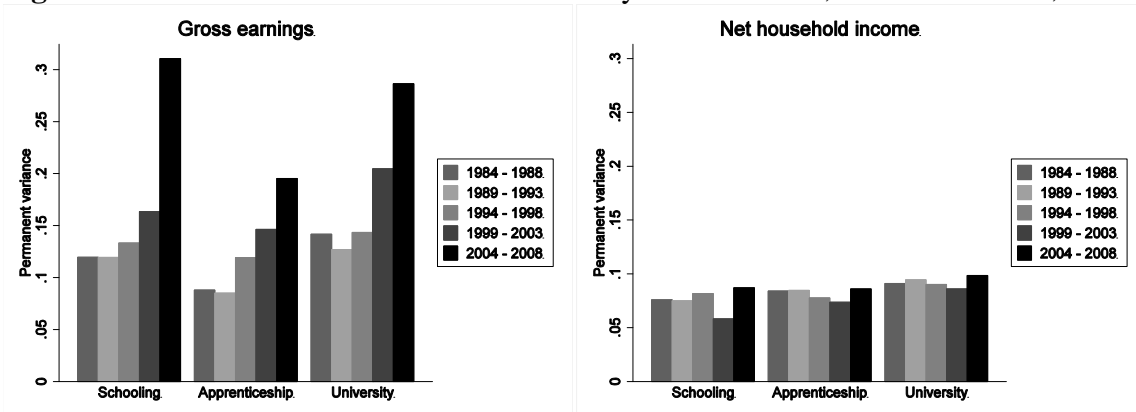

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Incomes are deflated by CPI to 2005 prices (in Euros).

4.3 Income Volatility and Education

Transitory variances for different education groups are presented in Figure 12. Between 1984 and 1998, persons with only schooling show the highest earnings volatility. Since 1998, those with a university degree also experience elevated levels of earnings volatility. In four out of five periods a vocational qualification seems to predict more stable earnings, as this group's transitory variance is below those of the other education groups. This may be due to the fact that job changes are more costly for trained workers who accumulate firm-specific skills which are not entirely transferable, as Bougheas and Georgellis (2004) accentuate. The loss of accumulated firm-specific skills is higher the longer a worker has stayed with a firm. Transitory variances of net household income differences between education levels are less pronounced, but in four out of five periods net household income of university educated is the most unstable.

Figure 12. Transitory Variances of Real Monthly Income, Education Level, 1984-2008

As Figure 13 shows, both income concepts are permanently more unequally distributed among those with university degrees. The higher income dispersion can be explained by greater household heterogeneity: university educated obviously cover a range from high income singles living alone to single earner households with moderate income.

Figure 13. Permanent Variances of Real Monthly Gross Income, Education Level, 1984-2008

4.4 Income Volatility and Household Groups

Since households with more than two income earners, unlike individuals living alone, can stabilize their economic situation through income pooling in the event one earner experiences an income shock, a disaggregated look at different household types seems necessary. Indeed, Shore (forthcoming) finds that the labor income risk faced by a husband is substantially reduced by adding the wife's labor income. Furthermore, household income instability may also reflect ongoing changes regarding the household formation in Germany. Average

household size has decreased sharply. Higher risk of divorce and a lower frequency of marriages increased the number of one-person households. Hence, the aforementioned impact of income pooling applies to fewer and fewer households. On the other hand, the number of childless couples has grown. Variances of annual incomes are considered because household income before and after government intervention is only available on an annual basis.

As Figure 14 shows, in four out of five periods gross income volatility is twice as high for singles as for couples. This finding demonstrates the importance of income pooling in reducing household risk. Volatility of net household income is more or less the same for the three household types, but is lowest for families, who are eligible for child benefits and other child-based transfers.
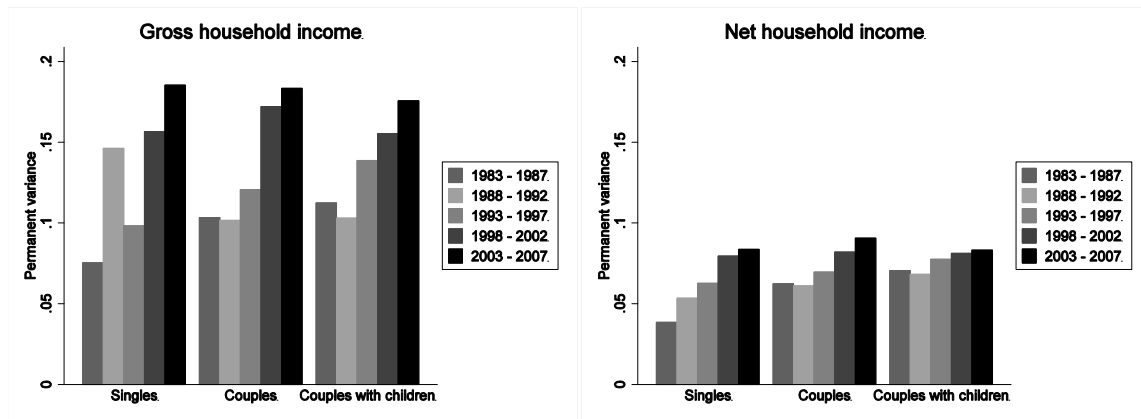
Figure 14. Transitory Variances of Real Annual Income, Household Types, 1983-2007
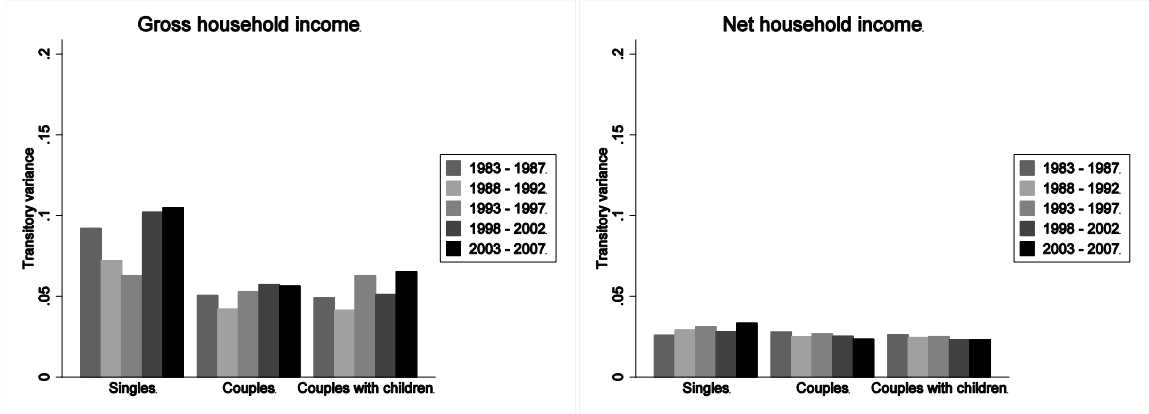
Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Incomes are deflated by CPI to 2005 prices (in Euros).

Gross income dispersion grows over time for all three household types, but does so most sharply for the increasing number of single households, as can be seen in Figure 15. Peichl et al. (2010) emphasize that the increasing inequality in Germany is predominantly caused by the change in household formation, specifically, the rising number of one-person households. Interestingly, the dispersion of net household income also rises quite steadily for singles and couples without children. All other subgroups reveal rather stable net household income distributions.

Figure 15. Permanent Variances of Real Annual Income, Household Types, 1983-2007

Source: German Socio-Economic Panel (GSOEP), own calculations
Notes: Only males in the workforce and with residence in the Old German Laender are considered; students and severely disabled persons are excluded. Incomes are deflated by CPI to 2005 prices (in Euros).

5 Conclusion

We analyze permanent and transitory variance of male earnings and equivalent household income for Germany from 1984 to 2008. Both permanent and transitory variances of gross earnings have increased substantially over the period under observation. Individuals may thus be justified in perceiving greater uncertainty due to labor market reforms and globalization. Furthermore, the increase in permanent and transitory variance earnings is experienced very differently by population subgroups. For instance, being a low income earner, young and single increases the risk of facing higher earnings volatility.

Still, taking the welfare state and its institutions into account, we find that net household income has remained quite stable, in contrast to the development of earnings. Hence, the German welfare state is able to insure employees against rising insecurity.

Following the assumption that permanent and transitory variance sum to the total cross-sectional variance, we find that inequality in Germany is predominantly explained by the permanent variance, i.e. about 60 percent of total gross earnings inequality. For net household income the figure is 77 percent through 2000, and 79 percent thereafter. Hence, the share of transitory variance in overall inequality is higher for earnings than for net household income. Accordingly, the German welfare state is an effective device for insuring households' disposable incomes and raising their expected utility.

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