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Incomes and inequality in the long run: the case of German elderly

by Timm Bönke, Carsten Schröder and Katharina Schulte

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Incomes and inequality in the long run: the case of German elderly

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Abstract. We employ German Sample Survey Income data to examine income inequality and the financial situation of elderly citizens for the period from 1978 to 2003, focussing on differences between retired and non-retired elderly and between elderly with residence in the Old and the New German Laender. Inter-temporal changes in income inequality are also decomposed by income sources. To our knowledge, this is the first study that provides comparable and detailed longitudinal income statistics for the German elderly. We find some remarkable inter-temporal patterns. First, the financial situation of the elderly has improved substantially over time. This is true especially for the New Laender, although elderly with residence in the Old Laender remain financially privileged. Within the same age cohort, we also find that non-retired, on average, are financially better-off compared to retired elderly. For reunified Germany, inequality is astonishingly stable over time, but rises significantly since 1993 in the New German Laender.

Key Words: Pensioner, Inequality, Inequality Decomposition, German Sample Survey Income data

JEL Codes: D31, H31, H55, J14

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1 Introduction

This study investigates the financial situation of German elderly, being defined as persons age 55 and older, during two and a half decades from year 1978 to 2003. Amongst other reasons, this era is interesting as several regulations of the statutory German pay-as-you-go (PAYG) old age pension system have been modified. In the late 1970s, the German pension system was expanded to one of the World's most generous ones, both in terms of replacement rates and early retirement provisions. Despite distinct GDP growth, a raising fiscal imbalance – driven by population ageing, German reunification and high unemployment rates in the mid 1980th, in the 1990th and early 2000th – served as an argument to scale down the pension system. Several measures have been implemented, encompassing, amongst others, a raise of the eligibility age, replacement-rate reductions, and subsidies for private old-age provisions. An overview of 12 major reforms between 1977 and 2003 can be found in the Appendix (see Table A1). Since 2003, further reforms have been implemented or are currently being discussed. These reform measures are likely to have pervasive implications for the financial situation of the future elderly. Taking a stock of the financial situation of the elderly in recent years and in the past, therefore, can provide a useful yardstick for taxing the costs and benefits of the ongoing reform processes.

However, it is an open question as to who benefited or lost how much, and what the implications for inequality are. We provide representative data on the financial situation of the elderly, also decomposed by different age cohorts, by retirement status (yes/no), and by residence (New vs. Old German Laender). More precisely, for the entire time horizon and for each sample, we examine material well-being in terms of equivalent incomes, and also how much different income sources contribute to equivalent income and to inequality. To the best of our knowledge, this is the first study providing harmonized and detailed longitudinal statistics on income inequality among German elderly and their financial situation.

We find some remarkable inter-temporal patterns. First, the financial situation of the elderly, measured by means of price-adjusted gross equivalent income, has improved substantially over time. Interestingly, it turns out that income growth was rather stable over time in case of the retired, but quite volatile, and mirroring the German business cycles, in case of the non-retired elderly. In this sense, the German pension system has been an effective insurance device against aggregate GDP shocks. Second, the non-retired are financially better-off compared to the retired elderly, and the same holds for those with residence in the Old compared to those with residence in the New German Laender. Concerning the issue of income inequality, the distribution of equivalent incomes turns out to be rather flat among

elderly households. For example, comparing average equivalent incomes in the fourth (eight) and the first decile in 2003, the ratio is 1.93 (3.25) only. The income composition of high- and low income elderly, however, is rather different. During the whole period, retirement pensions from public pension fund and social benefits account for about 80 percent of total equivalent income in the first decile, but only for about 8 percent in the tenth decile. The group of elderly with high incomes is still active in the labour market, disposes of capital, or has been civil servants in their active period. For reunified Germany, inequality is astonishingly stable over time, but we find a significant increase of inequality since 1993 in the New German Laender.

The remainder of this article is organized as follows. Section 2 discusses candidate German databases and results from previous studies. Section 3 explains the technical details regarding the data processing. In Section 4 we briefly explain the inequality measures employed in the empirical analysis that follows in Section 5. The final section contains some concluding remarks.

2 Candidate databases and results from previous studies

Our study is based on six cross sections of the German Sample Survey of Income and Expenditure (EVS), collected in years 1978, 1983, 1988, 1993, 1998, and 2003. The EVS is provided by the German Statistical Office, conducted at 5-year intervals, and contains representative household-level income, wealth, and consumption data.² The sizes of the cross sections range between 40,000 to 60,000 observations (household units). An important advantage compared to several other German databases is that the EVS encompasses the *entire* elderly population, both the non-retired and the retired. Yet, the EVS also suffers from some limitations: persons living in communal establishments and institutions, and also households with a monthly net household income exceeding a threshold income, e.g., EUR 18,000 in year 2003, are not included.³

Previous studies concerning the financial situation of the German elderly usually provide rather aggregated statistics, in general referring to a single period. Most related to ours is the work of Börsch-Supan et al. (2001) who compute average incomes of the elderly, decomposed by several age cohorts and household types, and also some aggregate income-inequality indicators. Their analysis is static, restricted to EVS 1993. For EVS 1993 and EVS 1998, aggregate statistics on pensioners' incomes, wealth and consumption are provided by

² For further information, see German Federal Statistical Office (2007a).

³ According to the German Federal Statistical Office (2007a), the number of top-income households participating in the EVS is not sufficient to provide reliable information. Income cut-offs for earlier periods (in prices of 2003) are: €18,811 in 1978; €18,546 in 1983; €17,497 in 1988; €20,788 in 1993; €19,131 in 1998.

Münnich (2001). Schnabel (1999) estimates life-cycle incomes based on four EVS cross sections (1978 to 1993) combined with social security data. Income inequality, however, is not an issue of Schnabel's study.

Frommert and Heien (2006) study the role of the German statutory pension insurance for old age income, Kirner et al. (2000) the linkages between pension-system financing modes and old age income security. They employ AVID – 'Altersvorsorge in Deutschland' (Old-Age Provision in Germany). AVID provides micro-level data on types and amounts of entitlements to old-age incomes for the *non-retired* population only. For this reason, AVID is inappropriate for status-quo and retrospective analyses such as ours.⁴ 'ASID,' 'Alterssicherung in Deutschland' ('Old Age Insurance in Germany') is a complementary database to AVID, providing information about the incomes of the population age 55 and above.⁵ Yet, so far, only three waves (1992, 1995, and 1999) are publicly available. The 'Pension Access Statistic' (Rentenzugangsst Statistik) of the 'German Pension Insurance' (Deutsche Rentenversicherung) only contains micro-level data on households with members being entitled to public pensions.

Employing German Socioeconomic Panel (GSOEP) data,⁶ Siddiqui (1997) simulates the effects of the German 1992 Pension Reform Act on the frequency distribution of retirement ages using a discrete-time hazard model. Siddiqui (1997, p. 482, Table 4) predicts, already in the short run, an increase in the average age of retirement. Berkel and Börsch-Supan (2003) expect similar effects. Our data do not provide evidence in favour of their predictions. With GSOEP data, Mantovani et al. (2005) investigate the impacts of alternative pension reforms on old age poverty rates, Schwarze and Frick (2000) the distribution among the elderly from the mid-1980th to the mid-1990th. Schwarze and Frick find inequality to be U-shaped over time, and slightly increasing in more recent years of the observation period. On the opposite, we find a slight decrease for the same period. Yet, several technical details make their analysis incommensurable with ours, particularly with regard to the income concept: disposable income in case of Schwarze and Frick (2000) vs. pre-tax post transfers in our case.

Finally, Börsch-Supan et al. (2005) and Hallberg (2006) calculate inequality and poverty indices for the German elderly using the 'Survey of Health, Ageing and Retirement in

⁴ The 'Federation of German Statutory Pension Insurance Institutions' ('Verband Deutscher Rentenversicherungsträger', 'Deutsche Rentenversicherung Bund' since 2005) (VDR) and the German Federal Ministry for Labour and Social Affairs commissioned the Institute of Social Research ('TNS Infratest Sozialforschung') to carry out the AVID surveys 1996 and 2005. See TNS Infratest Sozialforschung (2007a) and (2007b).

⁵ Further details are provided in Federal Ministry of Labour and Social Affairs (2005).

⁶ For a detailed description of the GSOEP database see German Institute for Economic Research (2007).

Europe' (SHARE). SHARE is a cross-country micro-level database of individuals age 50 or older.⁷ Unfortunately, up until now only a single cross section in year 2004 has been collected.

3 Data processing and harmonization

For each year, our database of elderly subjects is a subset of all EVS households, restricted to persons age 55 and older. A minority of these elderly subjects had to be excluded from the database for technical reasons. First, intra-familial relationships remain unclear in some cases. This especially applies to households with three or more elderly. Second, income sources sometimes can not be assigned to the household members without extra assumptions. To reduce the inaccuracies resulting from these obstacles, only the first two elderly persons from every household unit are included in our database. The eliminated fraction of elderly persons due to this procedure is small, e.g., 4.3 percent in 2003. Another concern is over- and under-sampling. Compared with the German micro-census, EVS over-samples people in their 70ies on the account of subjects age 80 and older. To fit the German micro-census statistics, we have re-weighted the EVS data according to the entropy based minimum information loss principle.⁸

We distinguish several types of elderly subjects. If, in our database, a subject draws retirement or civil servant's pensions we call her a 'pensioner;' else a 'non-pensioner.' This differentiation should effectively distinguish subjects who draw retirement or civil servant's pensions from subjects that do not. Of course, several other options for differentiation exist. Labour market withdrawal, lack of earnings, receipt of retirement incomes, and age are typical criteria to define pensioner/retirement units. Alternative definitions of retirement and their empirical implications are discussed in Smeeding (1990). For Germany, see also Münnich (2001) and Münnich and Illgen (2000).

Furthermore, we distinguish subjects with residence in the Old from subjects with residence in the New German Laender, and split the sample in two age cohorts. The cohort 'C1' consists of all subjects age 55 to 64; 'C2' encompasses all subjects age 65 and older. Unweighted numbers of observations for the different sub-samples are provided in Table A2 of the Appendix. Those figures indicate small sample sizes in case of the sub-sample of non-pensioners belonging to cohort C2, especially in case of the New Laender. Deaton and Paxson (1994, p. 441), however, argue that even small sample sizes (34 households in their study)

⁷ See <http://www.share-project.org/> for further information.

⁸ Details on the re-weighting procedure can be provided by the authors upon request.

should give “fairly accurate measures of inequality.” According to their assessment, number of observations in our study should be sufficient except for the New Laender C2 non-pensioner sub-sample.

Income reported throughout this paper is yearly, ‘pre-tax-post-transfer’ equivalent income in prices of year 2003.⁹ For each EVS cross section, Table A4 in the Appendix summarizes the EVS variables pertaining to each income source. Obviously, income variables in one survey do not necessarily coincide with those in another survey. Subject to this technical limitation, we have computed the following income concepts:

- ‘incomes from employment:’ earned income and self-employed income;
- ‘old-age pensions:’ retirement pensions from public pension fund, civil servant’s pensions, company pensions, and other pensions;
- ‘transfers:’ benefits related to former employment, social assistance, family-related benefits, and other transfers;
- ‘income on investments,’ and
- ‘other incomes,’ which is a residual component that cannot unambiguously be assigned to the previous five income concepts.

The definition of a ‘pre-tax-post-transfer’ equivalent income requires several technical assumptions. First, as we want to ‘control’ for changes in the financial situation of other (younger) household members, individual incomes received by non-elderly household members are ignored. This is in line with the income concept suggested in Johnson and Stears (1996). Second, not all incomes are available at the *individual* level but at the *household-level*. This problem applies, especially, to ‘other incomes’ and ‘income on investments.’ Let the size of the original EVS household unit be n , then we add $1/n$ th of the same income source to the sum of individual incomes of each of its members,¹⁰ giving a ‘total individual income.’ Third, to account for the fact that two-member elderly households can benefit from economies of household size and income pooling, we transform individual income into the one-member household’s welfare ‘equivalent income.’ This is the sum of ‘total individual incomes’ of the elderly household members divided by the modified OECD equivalence scale, which is 1.5

⁹ Incomes of EVS cross sections 1978-1988 have been adjusted using consumer-price for the Old Laender. After the German reunification, consumer price indices for the whole of Germany have been employed. All indices are taken from the German Federal Statistical Office (2007b), and are reported in Table A3 in the Appendix.

¹⁰ For further details see the technical explanations in Table A4.

for a couple and 1.0 for the solitary elderly.¹¹ Equivalent income is then assigned to each elderly person.

As the number of elderly persons living in an EVS household unit is not necessarily concordant with the number of *all* household members, our income concept might underestimate the true level of household-size economies and underestimate the access to financial resources. For example, elderly living with younger high income recipients may benefit from intra-household income pooling. In this sense, our income concept is only a lower bound for the ‘true’ level of material comfort. By contrast, our income concept controls for changes in household arrangements and incomes of younger subjects when making inter-temporal comparisons of income.

One might also argue that a pre-tax-post-transfer income concept is a biased estimate of peoples ‘true’ living standards, as consumption and saving ultimately depend on *post-tax-post-transfer* income.¹² Yet, observations in our database usually cannot be treated as tax units, and computing post-tax-post-transfer income (especially for different income sources) would urge us to make strong assumptions on individual tax liabilities. Finally, pre-tax-post-transfer income is less sensitive to changes in the tax code, and thus might be a better indicator for assessing the impacts of previous pension reforms on the financial situation of the elderly.

4 Gini decomposition by income sources

Our inequality measure is the Gini coefficient, G , twice the area between the Lorenz curve and the uniform distribution line. The Lorenz curve is obtained by sorting all elderly persons in increasing order of equivalent income. Hence, the Lorenz curve displays the percentage of total equivalent income for the bottom $x\%$ of the elderly population. Typically, several income sources determine individual income, and respective income shares might alter as we move from the bottom to the top of the distribution. A decomposition analysis by income sources, therefore, might provide interesting insights.

We proceed by briefly summarizing the Gini decomposition by income sources suggested in Rao (1969).¹³ Let $i(i = 1, \dots, I)$ be an income source, and μ_i mean equivalent

¹¹ This conversion is in line with the OECD modified equivalence scale. It assigns a value of 1.0 to the one-member household, an increment of 0.5 to each additional adult household member. See OECD (2007) for details and alternative sets of equivalence scales.

¹² The suitability of different income concepts from a welfare perspective is discussed in Podder and Chatterjee (2002).

¹³ Our presentation is a brief summary of the analysis outlined in Podder (1993) and Podder and Chatterjee (2002), where further details are provided.

income of source i . Total average equivalent income is represented by μ . Then $w_i = \mu_i / \mu$ is the contribution of income source i to average equivalent income and the Gini index, G , is

$$(1) \quad G = \sum_{i=1}^I w_i C_i,$$

where C_i is the concentration coefficient of i . The concentration coefficient is twice the area between the concentration curve and the uniform distribution line. As the concentration curve of i is derived by sorting all observations in ascending order of *total* equivalent income – and not by the equivalent income of source i , the concentration coefficient range is $(-1,1)$. It is, therefore, the spread of an income source over the range of total equivalent income that determines whether that source has an inequality increasing or decreasing effect.

The impact of a change in mean equivalent income of i on G can best be captured by the Gini elasticity

$$(2) \quad \eta_i = \frac{\partial G}{\partial \mu_i} \frac{\mu_i}{G} = \frac{1}{G} \left[\frac{\mu_i}{\mu} (C_i - G) \right] \quad \text{with} \quad \sum_{i=1}^I \eta_i = 0.$$

The Gini elasticity η_i gives the percentage change in the Gini coefficient with respect to a percentage change in equivalent income of income source i . From equation (1) follows that

$\sum_{i=1}^I w_i (C_i - G) = 0$. If $(C_i - G) > 0$, the effect of income source i on G is positive, i.e., it has an inequality-augmenting effect. Correspondingly, if $(C_i - G) < 0$, income source i has an inequality-reducing effect. From (1) it can also be seen that an income source affects total inequality through two different channels: (a) through its relative share in total equivalent income, w_i ; (b) through its spread over the range of total equivalent income, C_i . The changes in w_i , C_i and G between two periods t and $t-x$, can be examined by,

$$(3) \quad \Delta G_t = G_t - G_{t-x}.$$

Let $\Delta w_{i,t} = w_{i,t} - w_{i,t-x}$ be the change in the share of income source i between periods t and $t-x$. Moreover, let the change in the concentration coefficient of income source i between the same two periods be $\Delta C_{i,t} = C_{i,t} - C_{i,t-x}$. If w_i and C_i are functions of time, the total derivative of (3) equals

$$(4) \quad \frac{dG}{dt} = \sum_{i=1}^I C_{i,t} \frac{\partial w_{i,t}}{\partial t} + \sum_{i=1}^I w_{i,t} \frac{\partial C_{i,t}}{\partial t},$$

and

$$(5) \quad \Delta G_t \approx \sum_{i=1}^I \left(\frac{C_{i,t} + C_{i,t-x}}{2} \right) \Delta w_{i,t} + \sum_{i=1}^I \left(\frac{w_{i,t} + w_{i,t-x}}{2} \right) \Delta C_{i,t},$$

for discrete periods.¹⁴ Equation (5) decomposes the change in the Gini coefficient over two periods in two components. The sum $\sum_{i=1}^I \left(\frac{C_{i,t} + C_{i,t-x}}{2} \right) \Delta w_{i,t}$ is the change of the Gini coefficient as a result of changes in the shares of different income sources in total equivalent income, the ‘*share effect*.’ The second term, $\sum_{i=1}^I \left(\frac{w_{i,t} + w_{i,t-x}}{2} \right) \Delta C_{i,t}$, quantifies the impact of changes in the concentration coefficients on overall inequality, the ‘*concentration effect*.’¹⁵

5 Empirical results

5.1 A snapshot for year 2003

Financial situation

The first row of Table 1 gives the average equivalent incomes for 2003 for the whole sample and for each sub-sample. Underneath, we report the equivalent income shares of the five main income sources (rows entitled “total share”), and for constituting income sub-aggregates. The figures reveal that, on average, non-pensioners are financially better-off compared to pensioners, and the same applies, as one would expect, to elderly living in the Old compared to those with residence in the New Laender. In case of non-pensioners the OL/NL difference in equivalent income is in particular high, about €15,423. Also the income composition is specific to the place of residence. *Ceteris paribus*, elderly in the New Laender rely much more on public transfers. For example, in case of pensioners (non-pensioners) in the New Laender, the income share of ‘retirement pensions from social security’ (‘transfers total share’) amounts to 76.33% (15.64%), compared with only 42.31% (4.29%) in the Old Laender. The opposite holds for ‘income from investments.’ In the Old Lander, the respective income share is about eight percentage points higher (17.30% compared with 9.13%). Most interestingly,

¹⁴ Podder and Chatterjee (2002, p. 8) have suggested an averaging of the two periods’ estimates as a “compromise – and for a better approximation,” as the changes can both be measured with respect to period t or with respect to $t-1$.

¹⁵ See Podder and Chatterjee (2002, p. 8) for details.

despite 13 years of German reunification, New Laender elderly still do not receive significant ‘civil servant’s pensions’ or ‘company pensions.’ These patterns are also reconfirmed by Table 2, where conditional means of the respective income source are reported.

Table 1 about here

Table 2 about here

Yet, maybe there is evidence of OL/NL convergence in case of the ‘younger’ cohort. To investigate this possibility, Table 3 provides cohort specific statistics on the financial situation of the elderly. Cohort C1 encompasses all individuals age 55 to 64, and C2 all individuals age 65 and older. But also for the younger cohort, OL/NL differences remain substantial. On average, equivalent income in cohort C1 in the Old Laender is €11,236 higher, even €15,508 higher in case of non-pensioners. The cohort C1 with residence in the New Laender also relies more on public transfers. The figures also suggest that, with the single exception being New Laender pensioners, the cohort C1 is financially better-off compared with C2. Reasons for this include a higher labour market participation rate in C1, as mirrored in high levels of ‘earned income’ and ‘self-employed income.’

Table 3 about here

Average equivalent incomes tell little about the income distribution among the elderly. Table 4, therefore, provides decile specific estimates of equivalent incomes and income shares. The entries are computed by arranging the elderly in ascending order of equivalent income. For each decile, the first row of Table 4 gives mean equivalent income. Income shares are reported underneath. Altogether, the income distribution is rather flat. For example, the ratio of average equivalent incomes for the fourth and the first decile is 1.92 only, and 4.10 for the ninth and the first decile. When moving from the bottom to the top of the income distribution, the income composition systematically changes. Whereas ‘retirement pensions from social pension fund’ (64.74%) and transfers (14.87%) have a share of about 80% in total equivalent income in the first decile, the fraction steadily drops to 8.63% in the tenth decile. Otherwise, the share of work-related incomes (‘self-employed income’ and ‘earned income’) rises from 4.54% in the first to 40.13% in the tenth decile. The income share of ‘civil servant’s pensions’ increases from 0.58% to 13.63%, and from 7.68% to 17.95% in case of

‘income on investments.’ Summing up, the financially better-off are still active in the labour market, dispose of capital, or have formerly been civil servants.

Table 4 about here

Table 5 portrays the composition of the sample over the income distribution. For each decile, the first column gives the number of pensioners, N_P , relative to all elderly persons,

$\frac{N_P}{N_P + N_{NP}}$, with N_{NP} being the number of non-pensioners. This ratio first increases and then

decreases when moving from the bottom to top of the income distribution. In fact, the fraction of pensioners is rather low at the two margins of the distribution, with a peak in the third and the fourth decile. The decile-specific fractions of elderly with residence in the Old Laender,

$\frac{N_{OL}}{N_{OL} + N_{NL}}$, are given in column two. It is transparent that Old Laender elderly are

overrepresented in the higher deciles. The last column of Table 5 gives the decile-specific

shares of elderly belonging to the cohort C1, $\frac{N_{C1}}{N_{C1} + N_{C2}}$, indicating that cohort C1 is over-

represented at the two tails of the income distribution.

Table 5 about here

Income inequality

Year 2003 Gini estimates are summarized in Table 6. These estimates indicate a remarkable OL-NL difference in inequality of 9.14 Gini points for the whole sample (column ‘pensioners & non pensioners’). To some extent, low inequality in the New Laender may echo a flat income distribution in the former German Democratic Republic. Yet, also the share of non-pensioners, among whom inequality is especially high, is rather small in the New Laender.

Cohort-specific Gini indices indicate higher inequality among pensioners of cohort C1. We will further comment on this finding in the next paragraph. However, the opposite is true for the sub-sample of non-pensioners. Here, the Gini coefficient related to cohort C2 is 15.88 points higher.¹⁶ A more thoroughly investigation of the socio-economic characteristics of C2 non-pensioners helps explaining the huge difference. Among C2 non-pensioners, there

¹⁶ The Gini coefficient of 5.65 for C2 non-pensioners with residence in the New Laender is owed to the rather small number of observations for this sub-sample.

is a number of rather rich self-employees (6.29% of the observations) with an average equivalent income from self employment of €68,193.9, and a number of rather poor subjects predominantly relying on social welfare (57.06% of the observations).

Table 6 about here

The results of the Gini decomposition by income sources are summarized in Table 7. For each income source and for each of its sub-aggregates, the respective concentration coefficient is reported. ‘Income from employment,’ ‘other incomes,’ as well as ‘income on investments’ turn out to be inequality-augmenting (for these income sources, $C_i > G$). ‘Incomes from employment’ has the highest concentration coefficient, followed by ‘other incomes’ and ‘income on investments.’ In particular ‘transfers’ but also ‘retirement incomes’ are inequality-reducing. This finding is reconfirmed for all sub-samples.

The estimates concerning the income sub-aggregates reveal several additional insights. First, the inequality-reducing effect of ‘total retirement income’ is solely driven by ‘retirement pensions from public pension fund,’ whereas ‘civil servant’s pensions,’ eminently boost inequality. The inequality-reducing effect of ‘transfers,’ above all, is due to ‘social assistance,’ whereas concentration coefficients of ‘family related transfers’ and ‘total incomes from employment’ are about equally high. An interesting finding concerns the estimates for elderly from the Old and New Laender. Typically, estimates in the Old Laender are higher, consistent with the OL-NL Gini index difference. ‘Income on investments,’ however, exhibits a higher coefficient in the New Laender. This is in line with the ‘income on investments’ estimates provided in Table 1 and Table 2: In the New Laender, the share of elderly actually drawing some ‘income on investments’ is rather small.

Informative as they are, concentration coefficients can only partly explain the overall picture. The impacts of changes in particular income sources on inequality can be measured by means of Gini elasticities, η_i s, provided in Table 8. As explained earlier, the Gini elasticity pertaining to income source i gives the percentage change in the Gini coefficient with respect to a percentage change in equivalent income of source i . All Gini elasticities reported in Table 8 are stated in percent. Concerning the entire sample, an increase in ‘retirement pensions from public pension fund’ causes the most significant decrease of the Gini coefficient, indicating its potential relevance for policies concerned with old-age income inequality. The same applies to ‘benefits related to former employment’ in case of non-pensioners with residence in the New Laender. On the contrary, elasticities with respect to

‘earned income’ followed by ‘civil servant’s pensions’ and ‘income on investments’ are usually high and positive.

Table 7 about here

Table 8 about here

5.2 Inter-temporal changes of incomes and inequality

Financial situation

Table 9 shows the inter-temporal changes in the financial situation in terms of income growth rates. All entries are mean equivalent incomes in prices of year 2003. Figures in rows 1-3 (rows 4-6) are income growth rates comparing years 1993 and 2003 (1978 and 2003). Underneath, growth rates for consecutive cross sections are reported. All numbers indicate a substantial improvement of the financial situation of German elderly. Between 1978 and 2003, average equivalent income of an elderly person grew by 37.60% in case of the Old Laender. In reunified Germany, the increase was 15.57% between 1993 and 2003. Different sub-samples experienced quite different income growth. In case of pensioners, growth rates, for example, are clearly higher compared to non-pensioners, and the same applies to cohort C2 compared to C1. Growth paths in the Old and New German Laender differ as well, and indicate a substantial catch-up process to the benefit of New Laender elderly. Between 1993 and 2003, incomes in the New Laender grew by 33.18% compared to 13.59% in the Old Laender. Another interesting finding concerns the inter-temporal volatility of growth rates. Except for the period 1978 to 1983, pensioners experienced rather stable income growth, about 8% within a 5-years period. By contrast, income growth rates of non-pensioners are rather volatile and typically mimic the German business cycle. In combination, these two patterns suggest an insurance effect of the German pension system against cyclical income variations over the business cycle.

Table 9 about here

Income inequality

Table 10 provides Gini coefficients for each of our cross sections. For reunified Germany, there are no apparent systematic changes in inequality since reunification. Results are more sophisticated if we decompose the sample by residence. Regarding the Old Laender elderly, inequality is slightly on the decline from 1993 to 2003, continuing a slight tendency already

transparent before reunification. This result is reconfirmed in case of Old Laender pensioners, whereas inequality remains remarkably stable among Old Laender non-pensioners. Concerning the latter, Gini coefficients in 1978 and 2003 differ by 0.94 points only. The picture in the New Laender is rather different. Here, inequality is on the rise since reunification. Taking New Laender pensioners as an example, the increase of the Gini coefficient is 15.70%; and 19.89% in case of non-pensioners. Another robust finding across all samples and periods in unison is the higher levels of inequality for cohort C1 compared with cohort C2. This is due to the higher share of ‘incomes from employment’ in case of cohort C1, a rather unequally distributed income source (see Table 3 in combination with Table 7).

Table 10 about here

For the better understanding of the driving forces behind these patterns, Tables 11a-c provide an inter-temporal inequality decomposition by income sources. As explained in Section 4, inequality can be decomposed into the changes in the income shares of different income sources and the changes in the inequality within the income sources themselves. So, we can investigate inter-temporal differences in overall inequality by quantifying, for each income source, the differences of income shares and of concentration coefficients for any two consecutive periods, t and $t - 5$. In order to keep the analysis tractable, we forbear from reporting cohort-specific estimates.¹⁷

We comment on the period since reunification first. Most remarkably is the sharp decrease in the share of ‘retirement incomes,’ falling by 2.59 percentage points from 51.14% between 1993 and 1998, and then increasing again by 6.74 percentage points between 1998 and 2003. However, we would like to stress that the conditional means of different sources of ‘retirement incomes’ remained rather stable over the same decade. For example, PAYG ‘retirement incomes’ (‘civil servant’s pensions’) in year 1993 amount to €10,557 (€18,843), €11,396 (€19,482) in 1998, and €12,439 (€20,819) in 2003. Hence, changes in the share of ‘retirement incomes’ must be put down to other causes: (a) a change in the sample composition, scrutinized in the last paragraph of this section; (b) changes in the shares of other income sources. Indeed, from 1993 to 1998, the share of ‘income on investments’ rises by about 1 percentage point (continuing, for the Old Laender, a positive trend dating back to 1988), and, in 2003, falls back to about its original 1993 level. This is in concordance with the long run trend of the German stock index (DAX). Between 1988 and 1993, the DAX

¹⁷ Cohort specific results can be provided by the authors upon request.

experienced a 46.7 percent growth, even 120.6 percent between 1993 and 1998. Between 1998 and 2003, the DAX incurred a loss of 20.7 percent of its value.¹⁸ The drop of the ‘income from employment’ share is a mirror image of rising unemployment rates in Germany, especially in the New Laender. In reunified Germany, unemployment increased from 8.1 percent by the end of 1993 to 8.8 percent in 1998 and 9.4 percent in 2003.¹⁹ Typically, patterns concerning the income shares can also be reconfirmed for each of our sub-samples, although amplitudes of changes are typically higher in case of the New Laender. The aggregate effect of changes in the income shares on inequality is the share effect. Comparing years 1993 and 1998, it is high and positive, small and negative between 1998 and 2003. This means that changes in the income shares increased inequality between 1993 and 1998, but had an inequality reducing effect between 1998 and 2003.

There are no apparent patterns concerning inter-temporal differences of concentration coefficients in reunified Germany. Most remarkably is the high positive value for ‘income from employment’ concerning the period 1993 to 1998, indicating that this income source over time became more unequally distributed. Interestingly, the same difference is negative for the two sub-samples of pensioners and non-pensioners. Then ‘income from employment’ should have become more unequally distributed *between* non-pensioners and pensioners. Indeed, between 1993 and 1998 the difference in ‘income from employment’ (price-adjusted) between these two sub-samples increased by €831, from €22,394 in year 1993 to €23,225 in 1998. The concentration coefficient of ‘income on investments’ also incurs a substantial increase between 1993 and 1998 of 4.20 percentage points, indicating that especially the financially better-off benefit from higher returns from capital in this period. Bearish stock markets lead to an inverse effect between 1998 and 2003. The aggregate measure of inter-temporal changes in the concentration coefficients on inequality is the concentration effect. Comparing 1993 and 1998 for reunified Germany, the concentration effect is small, even negative in case of non-pensioners (irrespective of the place of residence). However, it is *always* positive concerning the years 1998 and 2003, indicating increasing inequality levels within the income sources themselves.

Table 11b contains all necessary information concerning the pre-reunification period in the Old Laender. Altogether, the distribution in the Old Laender is rather stable over time. However, between 1983 and 1988 inequality drops noticeably. Basically, this can be

¹⁸ At year-end, the German stock index was 1,328 points in 1988; 2,267 points in 1993; 5,002 points in 1998; 3,965 points in 2003.

¹⁹ All numbers according to the ILO unemployment concept. Data can be downloaded from the German Statistical Office.

explained by a decreasing share of the rather unequally distributed ‘income from employment,’ in combination with falling concentration coefficients of ‘retirement incomes’ and ‘income from investments.’ The decreasing share of ‘income from employment’ can be explained by the recessive period with rapidly increasing unemployment rates beginning in the early 1980th.

Table 11.a-c about here

Sample composition

We next turn to the question as to whether the composition of the elderly population has changed over time. We are especially interested in average age and in the fraction of pensioners in the entire elderly population. Both statistics are provided in Table 12. The first column gives the average age in the (sub-)samples over the observation period. For both the period before and after reunification, we find that our sample ages slightly. Average age rises from 67.37 to 67.68 between 1978 and 1988, falls to an average of 67.20 years after reunification (1993) and then again rises to 68.11 years in 2003. In the three adjacent columns, we provide fractions of pensioners among German elderly. In reunified Germany, the share of pensioners is increasing in accordance with sample ageing. Only focusing on the Old Laender, the share of pensioners drops slightly from 81.95 percent in 1978 to 78.80 percent in 1998, and then sharply increases to 82.10 percent in 2003. In 2003, almost the entire Old Laender cohort C2, receives retirement incomes (99.26 percent of the sub-sample), compared to 96.81 percent in 1978. It is interesting to note that even in case of cohort C1, the fraction of pensioners is more than 50%, despite noticeable replacement rate reductions in recent years. In case of the New Laender, these fractions are still higher. This especially applies to the cohort C1. In case of this sub-sample, the share of pensioners sharply rises from 49.23 in year 1993 to 66.74 percent in 1998, and slightly falls to 63.25 percent in 2003. Obviously, early retirement facilities are still advantageous for many insureds, particularly in the New Laender, where favourable early retirement regulations were implemented to reduce official unemployment rates.

Table 12 about here

6 Concluding remarks

This paper has described the financial situation and income inequality among German elderly over the period 1978 to 2003, using harmonized cross-sectional German Sample Survey

Income data. To our knowledge, this is the first longitudinal analysis providing comparable estimates for Germany at such a level of detail. Our findings, therefore, throw new light on the incomes of the elderly over a period where Germany experienced both, long stable phases of income growth, recessions, significant changes in the basic conditions due to population ageing and the German reunification, and a flood of major and minor pension reforms.

Our findings document that the incomes of the elderly increased substantially during the two and a half decades we have studied, especially in the New German Laender. From all income sources, 'income on investments' increased most significantly. Income growth rates were remarkably stable for retired, but quite volatile in case of non-retired elderly. In this sense, the German pension system is an effective insurance device against aggregate GDP shocks. Concerning the issue of income inequality, we find that the income distribution of the elderly is both rather stable and flat. In the Old Laender, the Gini coefficient indicates slightly less inequality in recent years. In the New German Laender, however, inequality increased significantly since reunification, conforming to the Old Laender level. From the distinguished five income sources, the distribution of 'incomes from employment' and 'income from investments' are most uneven, whereas 'retirement incomes,' especially PAYG pensions, have an inequality reducing effect.

Recent reforms of the German pension system include a paradigm shift towards a more funded pension scheme and a raise of the retirement age from 65 to 67. To compensate for the resulting lowering of future replacement rates, in year 2001 the German government started to promote the development of private pensions by means of special saving subsidies and tax incentives (Riester-scheme). As the Gini elasticity with respect to PAYG pensions is negative and positive with respect to 'income on investments,' these reform measures are likely to increase income inequality among elderly in the future. Moreover, recent work has shown that the Riester-scheme, so far, has neither increased the fraction of households with positive savings, nor saving rates (for details see Corneo et al., 2007). It is, therefore, likely that old-age poverty will become a more important issue in future decades. We hope that our work can serve as a useful yardstick for evaluating the pros and cons of the implemented and scheduled pension-system reforms.

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Table 1. Equivalent incomes and equivalent-income shares, 2003

income source		pensioners & non-pensioners			pensioners			non-pensioners			
		<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	
total gross mean equivalent income		μ	26,752	28,122	20,563	24,748	25,818	20,104	36,336	38,687	23,263
incomes from employment	total share	w_1	20.69	21.58	15.16	6.73	6.87	5.99	66.14	66.61	61.75
	self-employed income	w_{11}	4.02	4.38	1.83	1.66	1.84	0.68	11.71	12.14	7.67
	earned income	w_{12}	16.66	17.20	13.33	5.07	5.03	5.31	54.43	54.47	54.08
retirement incomes	total share	w_2	53.34	51.20	66.57	67.77	65.80	78.74	6.33	6.50	4.73
	PAYG	w_{21}	36.33	31.89	63.77	47.49	42.31	76.33	0.00	0.00	0.00
	other pensions	w_{22}	2.46	2.54	2.00	1.32	1.29	1.47	6.20	6.37	4.66
	company pensions	w_{23}	4.29	4.95	0.24	5.57	6.52	0.28	0.13	0.13	0.07
	civil servant's pensions	w_{24}	10.25	11.82	0.55	13.39	15.68	0.66	0.00	0.00	0.00
transfers	total share	w_3	2.31	1.94	4.59	1.36	1.17	2.41	5.40	4.29	15.64
	former employment related benefits	w_{31}	1.32	1.04	3.09	0.47	0.35	1.14	4.12	3.16	13.00
	social assistance	w_{32}	0.27	0.27	0.26	0.15	0.16	0.11	0.65	0.60	1.05
	family-related benefits	w_{33}	0.04	0.05	0.01	0.01	0.02	0.00	0.14	0.15	0.06
	other benefits	w_{34}	0.67	0.59	1.22	0.73	0.65	1.16	0.50	0.39	1.52
income on investments		w_4	16.16	17.30	9.13	17.24	18.68	9.16	12.67	13.07	8.98
other incomes		w_5	7.51	7.98	4.55	6.90	7.48	3.70	9.47	9.53	8.90

Note. All shares are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; PAYG: retirement pensions from public pension fund; μ : unconditional mean equivalent income; w_i : income share of main income aggregate i ; w_{ij} : income share of income sub-aggregate j concerning i .

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 2. Conditional means of equivalent income in 2003

income source		pensioners & non-pensioners			pensioners			non-pensioners		
		<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
incomes from employment	self-employed income	14,328	15,207	7,734	7,765	8,220	4,238	23,535	25,092	12,330
	earned income	15,569	16,707	10,090	6,774	7,074	5,538	25,682	27,147	17,093
Retirement incomes	PAYG	12,439	11,713	15,387	12,439	11,713	15,387	---	---	---
	other pensions	7,799	8,314	5,248	4,533	4,667	3,975	15,565	16,132	10,783
	company pensions	3,672	3,788	761	3,657	3,771	736	9,178	10,768	2,521
	civil servant's pensions	20,819	20,824	20,259	20,819	20,824	20,259	---	---	---
Transfers	former employment related benefits	6,877	7,421	5,971	5,080	5,438	4,573	7,911	8,453	6,914
	social assistance	2,016	2,284	1,160	1,261	1,429	639	3,699	4,408	2,000
	family-related benefits	1,707	1,715	1,550	1,212	1,208	1,299	1,984	2,001	1,666
	other benefits	3,450	3,157	4,756	3,323	3,041	4,682	4,216	3,935	5,064
income on investments		5,779	6,362.41	2,788	5,743	6,360	2,733	5,945	6,374	3,116
other incomes		3,602	3,845.70	2,137	3,383	3,638	1,893	4,256	4,458	2,938

Note. Conditional means are calculated if household units where the respective income share is positive. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; PAYG: retirement pensions from public pension fund.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 3. Mean equivalent incomes by age cohorts in 2003

income source		age cohort	pensioners & non-pensioners			pensioners			non-pensioners			
			<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	
total gross mean equivalent income		μ	<i>C1</i>	30,549	32,529	21,293	26,241	27,708	20,067	36,515	38,911	23,403
			<i>C2</i>	24,186	25,113	20,093	24,158	25,078	20,119	28,494	29,842	7,806
incomes from employment	self-employed income	w_{11}	<i>C1</i>	7.07	7.54	3.71	2.58	2.86	1.01	11.53	11.95	7.69
			<i>C2</i>	1.42	1.58	0.55	1.27	1.40	0.55	21.51	21.87	0.00
	earned income	w_{12}	<i>C1</i>	33.65	34.11	30.41	12.32	11.98	14.27	54.89	54.96	54.23
			<i>C2</i>	2.16	2.25	1.66	1.96	2.01	1.65	28.59	29.01	4.41
retirement incomes	PAYG	w_{21}	<i>C1</i>	18.32	15.83	36.14	36.73	32.62	60.63	0.00	0.00	0.00
			<i>C2</i>	51.70	46.09	82.67	52.10	46.51	82.73	0.00	0.00	0.00
	other pensions	w_{22}	<i>C1</i>	4.14	4.22	3.62	2.05	1.90	2.90	6.23	6.40	4.68
			<i>C2</i>	1.03	1.06	0.89	1.00	1.03	0.89	4.69	4.77	0.00
	company pensions	w_{23}	<i>C1</i>	2.57	2.89	0.29	5.04	5.83	0.43	0.12	0.12	0.07
			<i>C2</i>	5.77	6.77	0.22	5.80	6.82	0.22	0.78	0.79	0.00
	civil servant's pensions	w_{24}	<i>C1</i>	7.08	7.96	0.80	14.20	16.41	1.35	0.00	0.00	0.00
			<i>C2</i>	12.95	15.22	0.38	13.05	15.36	0.38	0.00	0.00	0.00
transfers	former employment related benefits	w_{31}	<i>C1</i>	2.73	2.09	7.31	1.29	0.92	3.43	4.17	3.20	13.04
			<i>C2</i>	0.12	0.11	0.21	0.12	0.10	0.21	1.02	1.04	0.00
	social assistance	w_{32}	<i>C1</i>	0.29	0.27	0.41	0.12	0.12	0.16	0.46	0.42	0.77
			<i>C2</i>	0.25	0.26	0.17	0.16	0.18	0.09	11.22	9.79	94.92
	family-related benefits	w_{33}	<i>C1</i>	0.08	0.09	0.03	0.03	0.04	0.01	0.14	0.15	0.06
			<i>C2</i>	0.01	0.01	0.00	0.01	0.01	0.00	0.32	0.33	0.00
	other benefits	w_{34}	<i>C1</i>	0.61	0.53	1.16	0.73	0.70	0.91	0.48	0.37	1.53
			<i>C2</i>	0.73	0.63	1.26	0.73	0.63	1.26	1.21	1.23	0.00
income on investments		w_5	<i>C1</i>	14.83	15.56	9.63	17.08	18.29	10.06	12.59	12.98	9.00
			<i>C2</i>	17.30	18.84	8.78	17.30	18.85	8.79	17.17	17.46	0.00
other incomes		w_5	<i>C1</i>	8.61	8.91	6.50	7.83	8.34	4.86	9.40	9.45	8.92
			<i>C2</i>	6.56	7.16	3.22	6.51	7.10	3.23	13.50	13.71	0.67

Note. Shares are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; PAYG: retirement pensions from public pension fund; μ : unconditional mean equivalent income; w_{ij} : income share of income sub-aggregate j concerning i . *C1*: cohort age 55 – 64; *C2*: cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 4. Equivalent incomes by deciles in 2003

income source		Decile									
		1	2	3	4	5	6	7	8	9	10
mean gross equivalent income		9,758	13,852	16,445	18,762	20,984	23,544	26,843	31,682	39,966	65,659
incomes from employment	total share	4.54	4.88	6.21	6.06	7.53	9.13	15.34	20.87	28.15	40.13
	self-employed income	0.94	0.84	1.11	1.18	1.15	1.32	1.72	2.90	3.09	10.63
	earned income	3.60	4.04	5.10	4.88	6.38	7.81	13.62	17.97	25.06	29.50
retirement incomes	total share	67.22	74.21	74.45	73.53	72.75	67.54	59.99	52.38	44.69	27.51
	PAYG	64.74	68.62	67.62	65.65	61.46	54.10	41.99	27.99	17.50	7.85
	other pensions	0.67	1.71	1.30	1.50	1.92	2.67	3.12	2.99	3.12	2.64
	company pensions	1.23	3.12	3.63	4.11	4.38	5.11	5.14	5.44	5.29	3.39
	civil servant's pensions	0.58	0.76	1.90	2.27	4.99	5.66	9.74	15.96	18.78	13.63
transfers	total share	14.87	5.29	2.67	2.15	1.53	2.31	2.52	1.67	1.44	0.78
	former employment related benefits	8.60	3.80	1.86	1.48	1.09	1.35	1.34	1.05	0.39	0.30
	social assistance	5.58	0.60	0.08	0.13	0.08	0.05	0.03	0.01	0.01	0.01
	family-related benefits	0.01	0.01	0.00	0.02	0.01	0.05	0.03	0.04	0.09	0.07
	other transfers	0.68	0.88	0.73	0.52	0.35	0.86	1.12	0.57	0.95	0.40
income on investments		7.68	11.12	13.00	14.34	14.42	17.01	17.75	18.38	16.78	17.95
other incomes		5.69	4.49	3.67	3.92	3.77	3.99	4.38	6.70	8.95	13.64

Note. Unconditional means are calculated for the whole sample including household units where the respective income share is zero. Abbreviations denote the following: PAYG: retirement pensions from public pension fund.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 5. Composition of the elderly population by deciles in 2003

Decile	$\frac{N_P}{N_P + N_{NP}}$	$\frac{N_{OL}}{N_{OL} + N_{NL}}$	$\frac{N_{C1}}{N_{C1} + N_{C2}}$
overall sample	82.71	81.88	34.21
1	79.10	76.55	42.94
2	90.27	77.64	33.56
3	92.74	75.66	30.03
4	92.46	73.09	31.12
5	92.40	72.52	29.59
6	90.16	78.79	30.76
7	84.24	84.11	41.45
8	79.14	90.45	47.75
9	69.86	93.81	52.94
10	56.68	96.13	63.11

Note. All numbers are reported in percent. Abbreviations denote the following: *N*: number of artificial one-member household units; *P*: pensioners; *NP*: non-pensioners; *OL*: Old Laender; *NL*: New Laender; *C1*: Cohort age 55 – 64; *C2*: Cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 6. Gini coefficients in 2003

age cohort	pensioners & non-pensioners			pensioners			non-pensioners		
	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
all	30.12	30.77	21.63	27.05	27.89	19.16	34.96	34.01	31.78
<i>C1</i>	33.05	32.75	27.08	28.81	28.90	23.13	34.55	33.54	31.56
<i>C2</i>	26.40	27.54	17.45	26.18	27.30	17.37	50.43	49.66	5.65

Note. Gini coefficients are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; *PAYG*: retirement pensions from public pension fund; *C1*: Cohort age 55 – 64; *C2*: Cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 7: Inequality decomposition by income sources in 2003

Income source			pensioners & non-pensioners			pensioners			non-pensioners		
			<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
incomes from employment	total	C_1	63.97	63.53	60.64	58.88	57.49	66.50	41.72	40.20	43.58
	self-employed income	C_{11}	72.32	72.19	59.03	72.83	71.10	79.60	56.81	56.95	38.59
	earned income	C_{12}	61.96	61.33	60.87	54.30	52.50	64.81	38.48	36.47	44.29
retirement incomes	total	C_2	13.15	13.84	9.69	18.22	19.74	10.98	20.53	15.96	34.05
	PAYG	C_{21}	-4.44	-5.66	7.65	1.38	0.95	9.41	---	---	---
	other pensions	C_{22}	42.70	40.11	49.89	36.95	34.02	51.15	19.81	15.10	34.82
	company pensions	C_{23}	33.84	28.49	39.24	40.50	35.85	45.21	55.73	57.42	-18.05
	civil servant's pensions	C_{24}	59.76	54.65	86.55	66.84	62.57	88.06	---	---	---
transfers	total	C_3	-13.64	-14.96	-3.88	5.91	0.79	24.10	-41.13	-41.69	-24.13
	former employment related benefits	C_{31}	-22.75	-18.08	-25.36	-7.61	0.89	-14.73	-43.59	-43.49	-27.92
	social assistance	C_{32}	-79.31	-79.19	-85.42	-70.13	-69.97	-79.98	-82.54	-84.22	-78.77
	family-related benefits	C_{33}	61.38	0.57	78.09	58.89	53.28	94.64	35.77	30.67	51.75
	other benefits	C_{34}	25.36	0.14	67.39	29.25	16.63	71.80	11.25	11.27	43.07
income on investments		C_4	37.93	35.41	38.22	40.10	37.78	40.59	31.64	29.20	28.65
other incomes		C_5	53.98	51.82	58.89	54.26	52.01	60.29	45.22	43.72	50.16

Note. All numbers are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; PAYG: retirement pensions from public pension fund; C_i : concentration coefficient of main income aggregate i ; C_{ij} : concentration coefficient of income sub-aggregate j concerning i .

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 8. Gini elasticities in 2003

income source			pensioners & non-pensioners			pensioners			non-pensioners		
			<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
incomes from employment	total	η_1	23.26	22.98	27.34	7.92	7.28	14.80	12.79	12.13	22.91
	self-employed income	η_{11}	5.64	5.89	3.17	2.81	2.85	2.15	7.32	8.19	1.64
	earned income	η_{12}	17.62	17.09	24.17	5.11	4.43	12.65	5.47	3.94	21.27
retirement incomes	total	η_2	-30.05	-28.18	-36.76	-22.12	-19.24	-33.61	-2.61	-3.45	0.34
	PAYG	η_{21}	-41.69	-37.75	-41.22	-45.07	-40.87	-38.82	---	---	---
	other pensions	η_{22}	1.03	0.77	2.61	0.48	0.28	2.46	-2.69	-3.54	0.45
	company pensions	η_{23}	0.53	-0.37	0.20	2.77	1.86	0.38	0.08	0.09	-0.11
	civil servant's pensions	η_{24}	10.08	9.17	1.65	19.70	19.49	2.37	---	---	---
transfers	total	η_3	-3.36	-2.89	-5.41	-1.06	-1.13	0.63	-11.76	-9.55	-27.52
	former employment related benefits	η_{31}	-2.33	-1.65	-6.72	-0.60	-0.33	-2.02	-9.25	-7.19	-24.43
	social assistance	η_{32}	-0.97	-0.96	-1.30	-0.54	-0.56	-0.55	-2.17	-2.09	-3.67
	family-related benefits	η_{33}	0.05	0.04	0.03	0.02	0.02	0.02	0.00	-0.01	0.04
	other transfers	η_{34}	-0.11	-0.32	2.58	0.06	-0.26	3.18	-0.34	-0.26	0.54
income on investments		η_4	4.20	2.61	6.99	8.31	6.62	10.25	-1.20	-1.85	-0.88
other incomes		η_5	5.95	5.46	7.84	6.94	6.46	7.94	2.78	2.72	5.14

Note. All numbers are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; PAYG: retirement pensions from public pension fund; η_i : Gini elasticity of main income aggregate i ; η_{ij} : Gini elasticity of income sub-aggregate j concerning i .

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table 9. Income growth rates, 1978-2003

	age cohort	pensioners & non-pensioners			pensioners			non-pensioners		
		<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
$\left(\frac{\mu_{2003}}{\mu_{1993}} - 1\right) \cdot 100$	all	15.57	13.59	33.18	19.58	17.51	41.37	11.78	7.62	21.40
	<i>C1</i>	14.13	12.55	22.03	19.60	19.36	28.01	12.16	7.89	22.10
	<i>C2</i>	19.80	16.97	48.30	19.96	17.09	48.53	-2.29	1.05	-54.29
$\left(\frac{\mu_{2003}}{\mu_{1978}} - 1\right) \cdot 100$	all		37.60			42.56			24.78	
	<i>C1</i>		26.54			31.56			20.46	
	<i>C2</i>		47.07			47.78			47.03	
$\left(\frac{\mu_{2003}}{\mu_{1998}} - 1\right) \cdot 100$	all	5.15	4.50	7.15	9.12	8.31	11.71	0.36	0.94	-7.02
	<i>C1</i>	3.10	2.33	-0.46	7.36	6.50	2.70	0.31	0.89	-6.79
	<i>C2</i>	10.78	9.77	18.72	10.74	9.71	18.82	15.29	16.53	-44.06
$\left(\frac{\mu_{1998}}{\mu_{1993}} - 1\right) \cdot 100$	all	9.91	8.69	24.29	9.58	8.49	26.55	11.38	6.62	30.57
	<i>C1</i>	10.70	9.99	22.59	11.40	12.08	24.64	11.81	6.94	30.99
	<i>C2</i>	8.15	6.56	24.91	8.32	6.72	25.01	-15.25	-13.28	-18.30
$\left(\frac{\mu_{1993}}{\mu_{1988}} - 1\right) \cdot 100$	all		9.98			9.67			7.42	
	<i>C1</i>		6.14			3.08			6.43	
	<i>C2</i>		13.31			13.19			39.17	
$\left(\frac{\mu_{1988}}{\mu_{1983}} - 1\right) \cdot 100$	all		9.76			9.31			13.73	
	<i>C1</i>		8.01			8.78			5.11	
	<i>C2</i>		12.88			10.47			132.96	
$\left(\frac{\mu_{1983}}{\mu_{1978}} - 1\right) \cdot 100$	all		0.35			1.19			-5.09	
	<i>C1</i>		-1.93			-1.71			-0.20	
	<i>C2</i>		-1.70			0.94			-55.12	

Note. All incomes in 2003 prices. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; *C1*: cohort age 55 – 64; *C2*: cohort age 65 and older; μ_t : total gross mean equivalent income in period t .

Source. German Sample Survey of Income and Expenditures 1978-2003. Own calculations.

Table 10. Trends in inequality, 1978-2003

year	age cohort	pensioners & non-pensioners			pensioners			non-pensioners		
		<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
2003	all	30.12	30.77	21.63	27.05	27.89	19.16	34.96	34.01	31.78
	<i>C1</i>	33.05	32.75	27.08	28.81	28.90	23.13	34.55	33.54	31.56
	<i>C2</i>	26.40	27.54	17.45	26.18	27.30	17.37	50.43	49.66	5.65
1998	all	30.74	31.17	23.32	26.97	27.63	19.81	33.32	32.52	31.40
	<i>C1</i>	32.30	32.15	26.33	27.31	27.75	21.76	33.16	32.33	31.29
	<i>C2</i>	26.64	27.36	17.86	26.52	27.24	17.80	39.75	39.12	32.69
1993	all	31.32	31.21	20.71	27.43	27.37	16.56	35.15	33.64	26.51
	<i>C1</i>	32.90	32.49	23.32	26.77	26.71	17.75	34.84	33.22	26.51
	<i>C2</i>	27.83	27.79	15.36	27.59	27.52	15.34	52.82	53.09	23.32
1988	all		31.13			27.55			32.84	
	<i>C1</i>		31.59			27.06			32.09	
	<i>C2</i>		27.50			27.19			48.72	
1983	all		33.26			29.17			36.38	
	<i>C1</i>		31.84			27.93			31.10	
	<i>C2</i>		30.81			29.06			65.80	
1978	all		33.14			29.89			33.07	
	<i>C1</i>		31.97			29.04			30.38	
	<i>C2</i>		30.30			29.45			49.68	

Note. Gini coefficients are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; *C1*: cohort age 55 – 64; *C2*: cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 1978-2003. Own calculations.

Table 11a. Inequality Decomposition 1993-2003, Old and New Laender

		pensioners & non-pensioners		pensioners		non-pensioners	
		1998-1993	2003-1998	1998-1993	2003-1998	1998-1993	2003-1998
change in Gini	ΔG	-0.58	-0.62	-0.47	0.08	-1.83	1.64
income from employment	Δw_1	-0.58	-5.43	-1.27	-1.65	-5.64	-3.26
retirement incomes	Δw_2	-2.59	6.74	-3.94	2.37	-6.20	5.64
transfers	Δw_3	-4.55	-0.85	0.21	-0.47	1.45	-1.01
income on investments	Δw_4	0.57	-0.83	0.81	-1.12	1.72	-0.99
other incomes	Δw_5	1.08	0.36	4.18	0.87	8.67	-0.37
income from employment	ΔC_1	5.49	-1.84	-0.92	-5.84	-6.72	2.82
retirement incomes	ΔC_2	-2.60	5.55	-1.94	1.39	28.31	22.96
transfers	ΔC_3	-2.07	-9.83	12.64	0.29	-2.39	-7.24
income on investments	ΔC_4	4.20	-1.47	-1.68	-2.60	-3.74	-0.27
other incomes	ΔC_5	-1.89	5.87	20.80	11.32	12.46	3.02
share effect	SE	25.53	-2.88	0.19	-0.67	1.87	-0.90
concentration effect	CE	0.21	2.26	-0.65	0.76	-3.71	2.54

Note. All numbers are reported in percent. Abbreviations denote the following: Δw_i : change of share of main income aggregate i ; ΔC_i : change of the concentration coefficient of main income aggregate i .

Source. German Sample Survey of Income and Expenditures 1998 and 2003. Own calculations.

Table 11b. Inequality Decomposition 1978 – 2003, Old Laender

		pensioners & non-pensioners					pensioners					non-pensioners				
		1983- 1978	1988- 1983	1993- 1988	1998- 1993	2003- 1998	1983- 1978	1988- 1983	1993- 1988	1998- 1993	2003- 1998	1983- 1978	1988- 1983	1993- 1988	1998- 1993	2003- 1998
change in Gini	ΔG	0.13	-2.13	0.08	-0.04	-0.40	-0.73	-1.62	-0.18	0.27	0.26	3.31	-3.54	-0.81	-1.12	1.48
income from employment	Δw_1	-0.43	-2.12	1.01	-3.28	-4.97	-0.75	-1.59	0.07	-2.05	-1.04	-1.68	-1.53	-0.34	-8.94	-3.03
retirement incomes	Δw_2	-1.74	1.17	-2.59	-4.11	6.48	-1.18	0.50	-2.13	-3.92	2.05	-1.15	0.99	-0.16	-1.87	5.78
transfers	Δw_3	-0.49	0.34	0.37	0.11	-0.65	-0.68	0.00	0.01	-0.03	-0.29	-0.03	1.26	1.12	0.29	-0.89
income on investments	Δw_4	2.65	0.10	4.31	1.43	-1.22	2.62	0.21	5.13	1.38	-1.57	2.82	-0.26	2.46	1.79	-1.44
other incomes	Δw_5	0.01	0.50	-3.10	5.85	0.35	-0.01	0.87	-3.08	4.62	0.85	0.05	-0.46	-3.08	8.74	-0.43
income from employment	ΔC_1	-1.18	0.44	-1.60	-1.15	-1.96	-2.12	0.54	-4.40	0.36	-7.30	2.46	-1.81	1.60	-2.04	2.50
retirement incomes	ΔC_2	-0.09	-1.35	-1.03	-1.55	5.44	-0.82	-1.12	-0.94	-0.78	1.26	24.33	-14.73	0.95	-9.53	23.39
transfers	ΔC_3	-14.72	2.72	2.97	7.82	-12.85	-23.09	8.96	6.25	13.31	-5.61	-1.96	-13.06	1.25	5.97	-8.78
income on investments	ΔC_4	4.29	-2.63	2.19	-1.35	-0.70	3.54	-2.40	3.71	-1.07	-1.76	6.83	-1.73	-1.61	-1.99	0.19
other incomes	ΔC_5	-3.15	-3.25	-14.62	26.50	7.30	-4.54	-2.44	-16.99	21.96	12.41	-0.77	-1.22	5.57	12.62	5.37
share effect	SE	0.49	-1.14	1.15	-0.19	-2.70	0.27	-0.59	0.81	-0.19	-0.47	0.20	-1.12	-0.50	-0.18	-1.20
concentration effect	CE	-0.36	-0.99	-1.07	0.16	2.29	-1.00	-1.03	-0.99	0.45	0.73	3.11	-2.42	1.31	-0.94	2.68

Note. All numbers are reported in percent. Abbreviations denote the following: Δw_i : change of share of main income aggregate i ; ΔC_i : change of the concentration coefficient of main income aggregate i .

Source. German Sample Survey of Income and Expenditures 1998 and 2003. Own calculations.

Table 11c. Inequality Decomposition 1993 - 2003, New Laender

		pensioners & non-pensioners		pensioners		non-pensioners	
		1998-1993	2003-1998	1998-1993	2003-1998	1998-1993	2003-1998
change in Gini	ΔG	2.62	-1.69	3.26	-0.66	4.90	0.38
income from employment	Δw_1	3.55	-8.32	3.75	-4.97	18.71	-5.70
retirement incomes	Δw_2	-11.39	8.66	-8.49	4.46	-38.35	4.28
transfers	Δw_3	3.13	-2.05	1.21	-1.41	10.96	-0.88
income on investments	Δw_4	1.17	1.35	1.27	1.07	0.55	2.29
other incomes	Δw_5	3.54	0.36	2.25	0.85	8.13	0.02
income from employment	ΔC_1	-9.83	-6.73	-1.63	-6.62	-19.23	2.00
retirement incomes	ΔC_2	-1.88	6.97	-2.48	2.87	18.92	24.17
transfers	ΔC_3	7.01	-7.95	23.41	5.71	-5.39	-1.65
income on investments	ΔC_4	7.23	-1.23	7.02	-2.74	7.13	2.70
other incomes	ΔC_5	44.19	-3.01	44.69	5.16	38.22	-9.35
share effect	SE	4.00	-4.05	3.31	-2.41	10.65	-0.65
concentration effect	CE	-1.38	2.36	-0.05	1.75	-5.76	1.03

Note. All numbers are reported in percent. Abbreviations denote the following: Δw_i : change of share of main income aggregate i ; ΔC_i : change of the concentration coefficient of main income aggregate i .

Source. German Sample Survey of Income and Expenditures 1998 and 2003. Own calculations.

Table 12. Trends in the composition of the elderly population, 1978-2003

year	age cohort	average sample age	$N_P / (N_P + N_{NP})$		
			<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
2003	all	68.11	82.71	82.10	85.46
	<i>C1</i>	59.79	58.07	56.96	63.25
	<i>C2</i>	73.73	99.35	99.26	99.79
1998	all	67.23	79.58	78.80	82.99
	<i>C1</i>	59.43	56.62	54.00	66.74
	<i>C2</i>	73.94	99.36	99.29	99.73
1993	all	67.20	79.25	80.06	75.32
	<i>C1</i>	59.14	54.53	55.73	49.23
	<i>C2</i>	73.80	99.45	99.37	99.89
1988	all	67.68		81.55	
	<i>C1</i>	59.46		58.54	
	<i>C2</i>	73.89		98.93	
1983	all	67.55		80.33	
	<i>C1</i>	59.34		60.90	
	<i>C2</i>	74.05		95.72	
1978	all	67.37		81.95	
	<i>C1</i>	59.08		58.67	
	<i>C2</i>	72.66		96.81	

Note. All ratios are reported in percent. Abbreviations denote the following: *N*: number of artificial one-member household units; *P*: pensioners; *NP*: non-pensioners; *OL*: Old Laender; *NL*: New Laender; *C1*: cohort age 55 – 64; *C2*: cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 2003. Own calculations.

Table A1. Main pension reforms in the period 1978 – 2003

Year of Passing	Coming Into Effect	Reform act	Individual pension level
1977	01/1978 - 01/1979	20nd Rentenanpassungsgesetz	Reduced assessment of education and training periods for future pension claims
1978	07/1978 - 12/1981	21nd Rentenanpassungsgesetz	Pensions grow less than gross wages
1982	01/1983	Haushaltsbegleitgesetz 1983	Further reduction of assessment of education and training periods for future pension claims
1985	01/1986	Gleichstellung von Männern und Frauen bei den Hinterbliebenenrenten	Equal treatment of widows and widowers, and reduction of 'surviving dependants' pensions beyond specified income levels
1989	01/1992	Rentenreformgesetz 1992	Further reduction of assessment of education and training periods for future pension claims Stepwise increase of retirement age Increase of minimal term of insurance Change of pension adjustment procedure to net pension adjustment Introduction of adjustment costs for retirement before age 65
1996	10/1996 - 01/1997	Wachstums- und Beschäftigungsförderungsgesetz	Further reduction of assessment of education and training periods for future pension claims Stepwise process of retirement age is accelerated
1997	07/1998 - 01/2000	Rentenreformgesetz 1999	Introduction of a 'demographic factor' to link pensions with demographic change Increase of retirement age and lowering of pension levels for several insurant segments (in particular for highly disabled and surviving dependants)
1998	04/1999 - 06/1999	Rentenkorrekturgesetz	Adjournment of the Rentenreformgesetz 1999 until Dec. 31, 2000
1999	04/1999	Gesetz zur Neuregelung der geringfügigen Beschäftigungsverhältnisse	Tax exceptions for active pensioners
1999	01/2000	Gesetz zur Sanierung des Bundeshaushalts	Change of pension adjustment procedure to adjustment according to inflation
2001	01/2001 - 01/2002	Altersvermögensergänzungsgesetz	No pension adjustment for year 2001
2001	01/2002	Gesetz zur Verbesserung des Hinterbliebenenrechts	Increase of surviving dependants' pensions

Table A2. Unweighted number of observations, 1978-2003

year	unweighted sample size	age cohort	unweighted number of observations as share of sample size								
			pensioners & non-pensioners			pensioners			non-pensioners		
			<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>	<i>OL&NL</i>	<i>OL</i>	<i>NL</i>
2003	26,504	all	100.00	79.43	20.57	77.17	61.07	16.10	22.83	18.36	4.47
		<i>C1</i>	49.40	38.89	10.51	26.93	20.88	6.05	22.47	18.02	4.46
		<i>C2</i>	50.60	40.53	10.07	50.24	40.19	10.05	0.36	0.34	0.02
1998	28,923	all	100.00	76.66	23.34	75.40	56.75	18.64	24.60	19.90	4.70
		<i>C1</i>	54.38	40.57	13.81	30.03	20.90	9.13	24.34	19.67	4.67
		<i>C2</i>	45.62	36.08	9.54	45.36	35.85	9.51	0.26	0.23	0.03
1993	23,004	all	100.00	78.91	21.09	73.80	60.12	13.68	26.20	18.78	7.41
		<i>C1</i>	51.99	38.35	13.65	26.15	19.90	6.26	25.84	18.45	7.39
		<i>C2</i>	48.01	40.56	7.45	47.65	40.23	7.42	0.36	0.33	0.03
1988	24,988	all		100.00			77.51			22.49	
		<i>C1</i>		49.64			27.63			22.00	
		<i>C2</i>		50.36			49.88			0.49	
1983	24,375	all		100.00			75.75			24.25	
		<i>C1</i>		52.04			31.05			20.99	
		<i>C2</i>		47.96			44.71			3.25	
1978	29,087	all		100.00			77.60			22.40	
		<i>C1</i>		46.97			26.09			20.88	
		<i>C2</i>		53.03			51.51			1.52	

Note. Shares are reported in percent. Abbreviations denote the following: *OL*: Old Laender; *NL*: New Laender; *C1*: cohort age 55 – 64; *C2*: cohort age 65 and older.

Source. German Sample Survey of Income and Expenditures 1978-2003.

Table A3. Consumer-price indices for Germany

<i>Year</i>	<i>OL</i>	<i>NL</i>
1978	54.36	---
1983	68.92	---
1988	73.05	---
1993	86.08	85.09
1998	93.54	94.62
2003	100.00	100.00

Note. For 2003, consumer-price indices are available for the whole of Germany only.

Source. Own calculations from data of German Federal Statistical Office (2007b).

Table A4. EVS income variables

income source	components	EVS field-identification number					
		2003	1998	1993	1988	1983	1978
incomes from employment	earned income ^a	99; 100; 102; 103; 104; 108; 133	251-256; 258-263; 272-277; 279-284; 286-291; 314-319; 405-410	303-308; 429-434	186; 188; 190; 192; 299-304	187; 189; 191; 193; 300-305	149; 151; 153; 155; 262-267
	self-employed income	122; 123; 124	328-333; 335-340; 342-347	324-329; 331-336; 338-343; 345-351; 352-357; 359-364	194-199; 201-206; 208-213; 215-220; 222-227; 229-234	195-200; 202-207; 209-214; 216-221; 223-228; 230-235	157-162; 164-169; 171-176; 178-183; 185-190; 192-197
retirement incomes	PAYG	125; 126; 127	349-354; 377-382; 356-361	366-371; 373-378; 380-385	236-241; 243-248; 250-255	237-242; 244-249; 251-256	199-204; 206-211; 213-218
	civil servant's pensions	158; 159	566-571; 573-578	520-525; 527-532; 534-539	383-388; 390-395; 397-402	377-382; 384-389; 391-396	332-337; 339-344; 346-351
	company pensions	160; 130; 131	580-585; 384-389; 391-396	541-546; 548-553; 387-392; 394-399; 401-406	404-409; 411-416; 278-283; 285-290; 292-297	398-403; 405-410; 279-284; 286-291; 293-298	353-358; 241-246; 248-253; 255-260
	other pensions	132; 147; 150; 156	398-403; 503-508; 524-529; 559-564	408-413; 415-420; 422-427; 485-490; 492-497; 513-518	257-262; 264-269; 271-276; 362-367; 369-374	258-263; 265-270; 272-277; 356-361; 363-368	220-225; 227-232; 234-239; 290-295; 297-302; 304-309
transfers	former employment related benefits	135; 136; 137; 138; 146; 155	419-424; 426-431; 433-438; 440-445; 496-501; 552-557	436-441; 443-448; 450-455; 592; 593; 478-483; 506-511	306-311; 313-318; 320-325; 455; 466; 334-339; 348-353	307-312; 314-319; 321-326; 448; 459; 328-333; 342-347	269-274; 276-281; 283-288; 394; 410; 325-330; 311-316
	social assistance	141; 143; 144; 157	461-466; 475-480; 482-487	589; 464-469; 596; 597	452; 355-360; 456; 467	445; 349-354; 449; 460	391; 318-323; 395; 411
	family-related benefits	139; 140; 142; 145	447-452; 454-459; 468-473; 489-494	588; 457-462; 471-476	451; 341-346; 327-332	444; 335-340	390
	other transfers	151 ^b ; 152; 153; 154	531-536 ^b ; 538-543; 545-550	499-504; 600; 601	376-381; 459; 470;	370-375; 452; 463	325-330; 398; 414
income on investments		47; 177; 162	121; 617; 594-599	103; 614; 625	24; 453; 488	33; 446; 481	388; 389; 392; 426
other incomes		---	---	---	---	---	---

Note. 'Other incomes' is the income residual that cannot be assigned to the eleven other income sources. ^a In 1978, 1983 and 1988 'earned income' is reported for the household head, the spouse (if present), and 'children' (if present). For 'other' household members, only an aggregate amount is reported. In this case, we divide the aggregate amount by the number of 'other' household members and assign this ratio to each household member age 55 and above that is not the household head and not his/her spouse. ^b Although this position should be classified as 'other pensions' we reclassify it for reasons of better comparison as 'other transfers'.

Source. German Sample Survey of Income and Expenditures 1978-2003.