DISCUSSION PAPER SERIES

IZA DP No. 4634

Accounting for Imputed and Capital Income Flows in Income Inequality Analyses

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December 2009

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
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Discussion Paper No. 4634
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IZA Discussion Paper No. 4634
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ABSTRACT

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Using representative and consistent microdata from the German Socio-Economic Panel Study (SOEP) from 1985-2007, we illustrate that capital income (CI = return on financial investments) and imputed rent (IR = return on investments in owner-occupied housing) have become increasingly important sources of economic inequality in Germany over the last two decades. Whereas the operationalization of CI in this paper is based on monetary returns on financial investments only, our definition of IR follows a regulation by the European Commission, (EC) which is currently being used to harmonize income measurement for the European Statistics on Income and Living Conditions (EU-SILC) in Europe. While both of these components represent some kind of return on alternative private investments, our results indicate that they do not coincide in their impacts on income inequality and poverty. In line with the literature, net IR as defined according to the EC regulation tends to exert a dampening effect on inequality and relative poverty, very much driven by the increasing share of outright ownership among the elderly. On the other hand, inequality is boosted by CI especially when looking at the upper tail of the income distribution. As the German public pension scheme gradually loses its ability to maintain people's living standards into retirement, we find these effects to increase over time. The analyses presented here, exemplified for Germany, make a clear case for the joint consideration of all components of private investment income for the purpose of welfare analysis, be they of a monetary or non-monetary nature. This appears to be relevant in at least three dimensions of comparative research: (1) across time; (2) across space, regions, welfare regimes; (3) across the individual life course, thus analyzing the impact of investment income on intrapersonal mobility patterns.

JEL Classification: D31, D33, I31

Keywords: income inequality, decomposition, capital income, imputed rent, SOEP

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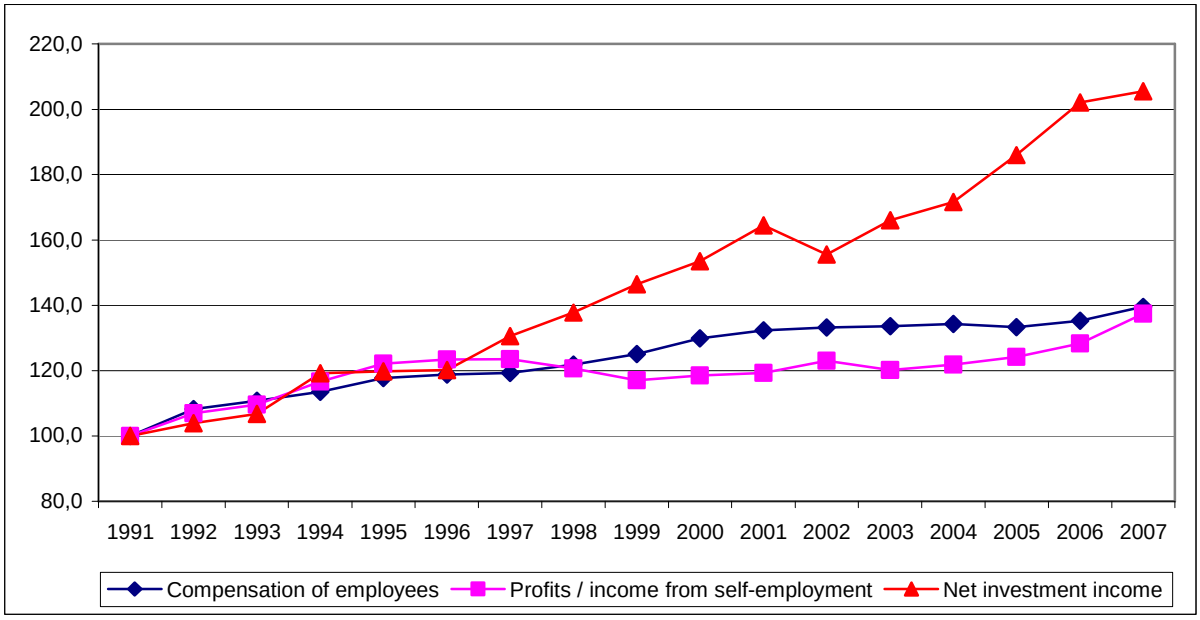
1 Motivation

Income inequality has clearly increased in the majority of OECD countries over the past 20 years (see OECD 2008). Various factors have contributed to this general trend, such as increasing unemployment, growing wage inequality induced by skilled-based technological change (see Card and DiNardo 2002) and immigration (for the US, see, e.g., Borjas 2006). Recent literature on growing inequality focussing on the upper tail of the distribution (Atkinson and Piketty 2007) has shown that, e.g., the superstar phenomenon (i.e., the compensation for CEOs) had an independent effect on increased inequality (Bebchuk and Grinstein 2005). Above and beyond such processes on the labor market, changing demographic structures also exert an independent effect on the income distribution: these include increasing shares of single-person households and lone-parent families, and the ageing phenomenon, together with selective mortality and lower fertility rates (see Reed 2006 for an analysis of the British case).

While the impact of increased earnings inequality on overall inequality has been described in depth, less is known about the impact of other specific income components, in particular investment income. This research gap is considerable, given that returns on investment and income from self-employment have clearly increased in importance compared to labour's share in domestic income in nearly all OECD countries over the past 20 years (OECD 2008). In Germany, this development was clearly in favour of net investment income (see Figure 1). While net investment income more than doubled over the period 1991-2007, employees' compensation as well as profits and income from self-employment increased by less than 40% only. Existing literature on the increasing importance of investment income (at the micro-level) includes Jäntti (1997) for Great Britain and the USA as well as Frässdorf et al. (2008) and Becker (2000) for Germany. All of these authors consistently report that the impact of property income on overall inequality is about two to three times higher than its contribution to overall income. However, all those papers consider only monetary returns on investments, thus ignoring (fictitious) income advantages arising from investments in owner-occupied housing. This appears to be inconsistent with the fact that buying one's own home is just an alternative to reaping benefits from investments in the capital market, i.e., receiving interests and dividends. However, there is a separate strand of literature focusing on the impact of non-monetary income components on income inequality, not at least in order to improve cross-national comparability of inequality analyses (see Canberra Group 2001). Im-

puted rent for owner-occupied housing is the most prominent example (see, e.g., Yates 1994 for Australia, Frick & Grabka 2003 for the USA, UK and Germany)[1]. Typically the *net* value of imputed rent increases in age due to the nature of the mortgage repayment schemes, thus yielding a decrease in income inequality and especially in relative income poverty among the elderly, and providing an effective means of old-age provision.

Figure 1: The development of income aggregates in the German System of National Accounts (SNA) (1991=100)



Source: authors' calculations based on The German Council of Economic Experts (SVR 2007).

Nevertheless, there appears to be no comprehensive analysis to date on the joint impact of monetary and non-monetary returns on capital investments. This lack appears even more crucial given that increased income inequality is typically accompanied by increased wealth inequality (see Frick and Grabka 2009). Both economic outcome measures interact, with high income earners typically having higher saving rates and thus accumulating more wealth than low income groups, i.e., wealth and financial wealth in particular can be a distinct source of income itself. One might hypothesize that this interaction is of specific relevance in

[1] The EU-funded project "Accurate Income Measurement for the Assessment of Public Policies (AIM-AP) provides a series of papers on the distributional impact of non-cash incomes from private sources (including imputed rent) as well as from public provision of services (in the domains of health, housing and education) for a variety of EU countries (see http://www.iser.essex.ac.uk/research/euromod/aim-ap-project). All of those empirical analyses clearly support the claim of considering non-cash incomes in the measurement of economic well-being.

ageing societies. Although the standard life-cycle theory (Jappelli and Modigliani 2005) predicts a consumption of capital in old age, (significant) dissaving cannot be observed in many countries including Germany, where the median elderly household showed a saving rate of above 4% (savings defined as additions to the physical capital stock, see Börsch-Supan et al. 2003). Thus elderly individuals tend to remain in a preferable wealth position, thus continuously receiving returns on their investments.[2] At the same time, elderly homeowners tend to profit above average from the consideration of imputed rent.

The increased importance of investment income can partly be explained by a shift in favour of a private coverage of old-age insurance, particularly in non-liberal welfare systems. Due to the significant reduction in benefits from the statutory pension insurance, employees increasingly need to participate in occupational and private pension schemes. As a consequence of this reorientation of the public old-age insurance system, individuals in general will enjoy higher claims from investment income, although most likely in a rather unequal manner.

The aim of this paper is give a comprehensive view of the joint impact of the two components of investment income, namely "(monetary) capital income (CI)" and "(non-monetary) imputed rent (IR)". We make use of more than 20 waves of consistently measured income data from the German Socio-Economic Panel (SOEP). After describing the microdata used and the methods applied to investigate the impact of investment income on overall inequality and poverty in Section 2, Section 3 presents the empirical findings with respect to the incidence and relevance, separately, of the two components of investment income, CI and IR. We consider these components in our "full" income concept relative to a "baseline" income concept net of investment income in order to investigate their respective impacts on inequality and poverty. Decomposition by subgroup is used to identify beneficiaries of investment income.. Section 4 concludes.

[2] However, the empirical analyses of the process of "dissaving" should not be evaluated simply on the basis of repeated cross-sectional and cohort specific data but rather using panel data in order to effectively control for selectivity in mortality (see DeNardi et al. 2009). In other words, comparing wealth endowments across age cohorts in a given point in time and inferring from this how well-off the future elderly will be may not adequately reflect the process of individual (dis)saving behaviour.

2 Data and Methods

2.1 The German Socio-Economic-Panel (SOEP)

The German Socio-Economic Panel (SOEP) is a representative longitudinal survey of individuals living in private households in Germany (Wagner et al. 2007). The survey was started in 1984 in West Germany and was extended to East Germany in June 1990, somewhat more than half a year after the fall of the Berlin Wall. The initial sample included over 12,000 respondents, with everyone aged 17 and over in sample households being interviewed. In recent years, new sub-samples have been drawn, which approximately doubled the initial sample size. Due to the high concentration of economic resources (income and wealth) at the top of the distribution, welfare analyses based on representative population surveys are often confronted with the lack of information on rich individuals. In order to overcome this problem, the SOEP introduced a high income sample in 2002, over-representing the top 3% of the income distribution—this sample is thus included in the more recent years of our time series. The sample analyzed in Section 3 employs all available observation years up to survey year 2007.

One of the main problems when asking for (specific) income and wealth information in any population survey is non-response, and SOEP is no exception to this rule. Due to the rather irregular and volatile nature of capital income, questions targeted at this income component are severely hampered by such measurement problems, clearly imposing a threat to the explanatory power and validity of the data. Making effective use of the panel nature of SOEP, any item non-response is corrected for by applying longitudinal (and cross-sectional) imputation techniques, thus at least reducing eventual bias arising from the above-mentioned selectivity (see Frick and Grabka 2005).

Another problem in the empirical assessment of the impact of capital income on inequality lies in the volatility of this income component (even before the recent financial crisis). Single cross-sectional analyses of capital income can suffer from discretionary changes and fluctuations in the value of an asset and the implicit returns. Thus it seems crucial to use repeated and consistently surveyed information about capital income over a longer period to isolate the independent effect of that income component on overall inequality. Again, the time

series information collected in SOEP from the very same households does help to assess the quality of the income information, including possible measurement error.

2.2 Definition of income measures

2.2.1 Baseline income

We assess the impact of CI and IR on inequality by comparing results from a more comprehensive (or "full") income concept, including these two components, with results derived from a baseline income excluding any investment income. Our analyses focus on economic well-being *after* redistribution through government and social security schemes, thus we apply a measure of equivalent annual post-government income.[3] We correct for different income needs of households with different sizes and age compositions by calculating equivalent incomes using the modified OECD scale, which assigns a value of 1 to the head of household, 0.5 to all adult household members aged 14 and over, and a value of 0.3 to children below 14 years of age. In order to allow for comparability across time, all incomes are expressed in euros (introduced only in 2002) and all measures are deflated to 2000 prices (including a correction of purchasing power differences between East and West Germany).

2.2.2 Components of investment income

In the following section, we briefly describe the two types of investment income which are at the heart of the empirical analyses in Section 3, namely capital income (CI) and imputed rent (IR).

2.2.2.1 Capital Income (CI)

The definition of capital income is anything but clear-cut, and reconciling macro- and micro-data requires harmonisation of measurement concepts. In the system of national accounts (SNA), capital income is being used as synonym for investment income and property income, and covers income derived from a resident entity's ownership of domestic and foreign assets. The most common types of investment income are income on equity (dividends, dis-

[3] When analysing CI in the context of disposable equivalent income (i.e., after taxes and public transfers), we use a *net* measure of CI by applying the individual average tax rate of the household to the originally collected gross measure of CI.

tributed income of corporations, branch profits, reinvested earnings, etc.) and income on debt (interest), as well as income from rentals and leasing, and royalties. Investment income includes the components direct investment income, portfolio investment, and other investment income (OECD 2007), and also covers income imputed to households from net equity in life insurance reserves and in pension funds. A complication comes with the fact that rent from land (less expenses from rentals) is counted as investment income in the SNA, whereas rental housing or equipment is regarded as a production activity, and the respective income received is treated as part of *mixed* income (as recommended in the 1968 SNA).

However, an investment in real estate rather than in the capital market yields the same level of return for the investor, thus this separation raises the question of whether the measurement of capital income may be biased when considering rent from land only. This general problem also applies to the fictitious imputed rental value for owner-occupied housing (IR). Again, in the SNA-imputed rents are counted as a production activity, although all household members enjoy a fictitious income advantage from this investment. If the same household had invested in the capital market rather than in real estate, a direct income flow of capital income would have been observed as part of the household's investment income.

This—from a layman's point of view artificial—differentiation hampers the analysis of capital income and its impact on overall inequality on the basis of population surveys. Obviously, the various subcomponents of investment income mentioned above are subject to specific measurement problems, especially for comparative research. A typical simplification is to lump together rent from land and other rental income. For example, in order to enhance comparability across various national datasets, the Luxembourg Income Study (LIS) does not separate these income types, and includes income from renting as part of property income.

Information about investment income in SOEP is collected at the household level for all household members. At first, SOEP asks separately for income from renting and leasing and for accompanying expenses. The final measure of total capital income is net of any expenses which are related to rentals.[4] SOEP does not differentiate between rentals from land and other rental income as the SNA does, but instead follows the procedure employed in LIS.

4 Due to the specific way in which this information is collected in SOEP, there is a lower limit of zero; thus, possible losses from renting and leasing are not considered.

Each household also has to specify whether any assets are held by any household member such as saving accounts, building savings contracts, life insurance policies, bonds, stocks or business assets. Each household also has to report the sum of all returns on the various investments received over the previous year. If the exact amount is not known, the respondents can give a rough assessment in six income categories—these values are transformed into metric information for the analyses to follow.[5] Other property incomes such as royalties are not covered by the SOEP questionnaire.

Another problem when trying to collect information about capital income in population surveys is the lack of detailed information about imputed income from investments, e.g., in life insurance reserves. While investors regularly (typically on an annual basis) receive information about the accumulated stock on their investments, this information usually does not report the portion attributable to interest only. Thus respondents are not able to provide information about the return on that investment. This is one reason why population surveys typically underestimate investment income compared to the SNA. The measure of capital income in SOEP thus also does not cover income imputed to households from net equity in life insurance reserves and pension funds.

According to Smeeding and Weinberg (2001), it is advisable to extend the concept of capital income to returns on private retirement pensions—as is done in the SNA. However, the concept "private retirement income" can consist of various forms of old-age provision. Private pensions could either be linked to an employment relationship, making them occupational pension plans, or they may be based on a contract between an individual and an insurance company, making them personal pension plans (e.g., cash-value life insurance contracts). While occupational pensions can be interpreted as deferred labour compensation, and thus should not be counted as capital income, personal pensions can be seen as an alternative form of investment in insurance plans instead of in the capital market. However, some occupational pension schemes—at least in Germany—allow employees to make voluntary contributions to a pension account, thus also yielding returns on private investment. It is therefore difficult to separate the pure "private" portion from the deferred labour compensation. Although SOEP tries to collect detailed information about pension incomes, it still faces this separation prob-

5 Although SOEP collects information on irregular income inflows (windfall income), such as one-time transfers, winnings, inheritances, gifts of money or goods, these are not considered in the measure of capital income employed below.

lem. Thus, while any pension payments received are part of our standard income measure, we refrain from considering returns derived from private pension plans in the measure of *capital* income.

When dealing with capital income, one might also think of capital gains. The Canberra Group (2001: 17) argues that "the theoretical argument for including capital gains in an extended measure of income is that this would be in line with the definition of income leaving a household as well off at the end of the accounting period as at the beginning. Capital gains or losses do have an effect on the economic behaviour of households and may affect their decisions on consumption." However, capital gains are not included in disposable income in the SNA, and the Canberra Group also does not recommended that they be considered (2001). While earnings on capital (such as dividends) are counted as income from an SNA perspective, capital gains (or losses) are not regarded as the result of a productive activity that affects GNP or total household income. Households almost certainly consider capital gains as a form of implicit saving, thus as a change in the value of an asset. This might be one reason why population surveys typically do not provide information about capital gains, as is the case with the SOEP.6 Above and beyond this data limitation we are not interested in changes in stocks but rather in changes in income flows, thus we refrain from considering capital gains in this paper, following the recommendation of the Canberra Group (2001: 28).

2.2.2.2 Imputed Rent (IR)

Imputed rent is a fictitious income advantage from owner-occupied housing. A household's decision to move into homeownership represents a trade-off in which the opportunity to invest in financial assets that would create real income flows through interest or dividends is foregone; thus, the welfare position of owner-occupiers would be biased as long as the fictitious return from housing is not considered in an extended income concept. Based on such considerations, European Commission (EC) Regulation No. 1980/2003 provides an accurate definition of imputed rent to be used to harmonize income measurement in the context of the European Statistics on Income and Living Conditions (EU-SILC): "The imputed rent refers to the value that shall be imputed for all households that do not report paying full rent, either because they are owner-occupiers or they live in accommodation rented at a lower price than

6 One exemption is the United States Bureau of the Census, which has published experimental measures of income that include, among other things, realized capital gains (see also Wolff and Zacharias 2009).

the market price, or because the accommodation is provided rent-free. The imputed rent shall be estimated only for those dwellings (and any associated buildings such a garage) used as a main residence by the households. The value to impute shall be the equivalent market rent that would be paid for a similar dwelling as that occupied, less any rent actually paid (in the case where the accommodation is rented at a lower price than the market price), less any subsidies received from the government or from a non-profit institution (if owner-occupied or the accommodation is rented at a lower price than the market price), less any minor repairs or refurbishment expenditure which the owner-occupier households make on the property of the type that would normally be carried out by landlords. The market rent is the rent due for the right to use an unfurnished dwelling on the private market, excluding charges for heating, water, electricity, etc."[7] According to the European Commission regulation, potential beneficiaries of IR include owner-occupiers, rent-free tenants and tenants with below-market rent, including those who live in public or social housing as well as those who have been granted a rent reduction by their respective landlord (e.g., relatives or employer).

While this general definition of imputed rent can be seen as a blueprint for population surveys, one problem lies in determining the exact measure of an equivalent market rent. This is of particular importance for countries such as in the UK with a relatively low share of tenants in the private housing market.[8] Another problem is the accurate consideration of owner-specific costs which need to be deducted to derive a measure of *net* imputed rent.

The SOEP measure of imputed rent employed in the following has been defined along the lines of the EC regulation using the *Opportunity Cost Approach.*[9] This procedure also includes advantages of living in subsidized rented accommodation or living rent-free (the latter group may indeed include former owner-occupiers (often outright owners), who hand over the deeds to their property to their children in exchange for a usufructuary right to remain in their current dwelling).

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7 See European Commission (EC) Regulation No. 1980/2003 of 21 October 2003 implementing Regulation (EC) No 1177/2003 of the European Parliament and of the Council concerning Community statistics on income and living conditions (EU-SILC) as regards definitions and updated definitions.

8 For a detailed discussion about measurement problems when deriving a fictitious income advantage from imputed rents see the various country reports which were published in the context of the EU funded project Accurate Income Measurement for the Assessment of Public Policies (AIM-AP) (http://www.iser.essex.ac.uk/research/euromod/aim-ap-project).

The opportunity cost approach applied in the SOEP is based on a regression of gross rent per square meter (not including heating costs) actually paid by main tenants in the private market. Independent variables include the year of construction, condition of dwelling, size of dwelling, length of occupancy, community size, and disposable income. Applying these regression coefficients to the population of otherwise comparable owner-occupiers and individuals living in households with reduced rent yields a gross measure of imputed rents. After deducting all owner-related costs such as operating, maintenance, and interest payments on mortgages, as well as property taxes, one arrives at a net value of IR that can be interpreted as the income advantage of owner-occupied housing. For rent-free households and persons living in households with below-market rent, no further deductions have to be made. The most important owner-specific costs are interest payments on mortgages.[10] Assuming a standard (German) mortgage with regular payments over a period of 30 years, we find an increasing income advantage for owners over the entire period. At the beginning of the payment period, interest payments clearly exceed the mortgage payments. As times goes by, the share of the mortgage that is paid off increases, leaving an increasing income advantage from owner-occupied housing (for more details on the imputation of IR in SOEP, as well as for sensitivity analyses showing the variation in the distributional impact by the choice of the method used to derive IR, see Frick et al. 2007).

Imputed rents are approximated both in the SNA as well as in population surveys. While IR in the SNA is counted as a production activity, thus not as investment income, population surveys typically provide IR as a separate piece of fictitious income information. Thus a user can decide whether IR should be counted as investment income or not. In the following, we describe the impact of the monetary component of investment income (CI) separately from the non-monetary, fictitious income advantage (IR) on the overall inequality.

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9 Other methods to derive IR, such as the market-value approach and the self-assessment approach, as well as differences in the final outcome measure of IR arising from the choice of the method used to derive IR, are described in detail in Frick and Grabka (2003) and Frick et al (2009).

10 Interest payments on mortgages are not tax-deductible in Germany. This is different from most of other European countries, where homeownership is explicitly promoted through various tax-favoured treatments.

2.3 Methodology

Following standard procedures in inequality research and in order to check the robustness and sensitivity of our findings, we employ various indicators of inequality: the Gini coefficient which is more sensitive to changes in the middle of the income distribution, as well as the half-squared coefficient of variation (HSCV) which belongs to the family of generalised entropy measures and is also referred to the I_2 measure.

$$(1) \qquad HSCV = \frac{C(y)^2}{2} = \left(\frac{1}{2n\bar{y}^2}\right)\sum_{i=1}^{n}(y_i - \bar{y})^2$$

This index is more sensitive to changes at the top end of the income hierarchy. Comparing time series on inequality results obtained from such measures when applied to income with and without CI and IR will help to identify where in the income distribution these two components matter most.

In order to analyze which population subgroups are most affected by the consideration of investment income in the final (full) outcome measure of disposable income, we make use of the decomposition by subgroups as described in Shorrocks (1984), based on the MLD. The MLD also belongs to the family of generalised entropy measures and is sensitive to changes at the lower tail of the income distribution. The MLD is also referred to as the I_0-Measure.

$$(2) \qquad MLD = \frac{1}{N}\sum_{i=1}^{N}\ln\left(\frac{\bar{y}}{y_i}\right)$$

Relative income poverty is calculated based on a threshold given by 60% of the national median of equivalent disposable income. We employ the family of poverty measures described by Foster, Greer, and Thorbecke (1984) using three different values for the poverty aversion parameter α, thus giving different weights to the individual's poverty intensity. This allows us to control for whether the incorporation of investment income impacts differently on individuals living in different proximities to the poverty line.

$$(3) \qquad FGT\ (a) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^a$$

3 Empirical results

Above and beyond describing what has been going on with respect to different types of investment income in Germany since the mid-1980s, we are especially interested to see which subgroups of the population might be affected most by these types of income.[11] The German pay-as-you-go (PAYG) public pension system is clearly under pressure to cut back, mostly due to increasing longevity and decreasing fertility rates, while at the same time, a range of newly established publicly co-funded financial instruments (e.g., *Riester-Rente*) are driving increasing numbers of people to invest in private old-age provision. Thus, age is a crucial structural variable in the following analyses. Among other issues, we will address the question of whether inequality decomposition by age (within/between-group inequality) has also changed over time due to the inclusion of CI and IR. At least for IR, this is to be expected from the literature (e.g., Yates 1994). However, the picture for CI may be less clear. On the one hand, the elderly are typically more risk-averse and "conservative" in their investment behaviour, which should yield lower interest. On the other hand, due to their longer periods of accumulation, their financial holdings (wealth stock) should be higher, thus also improving their chances for risk diversification.

The following section contains time-consistent estimates for Germany based on annual income data from the SOEP. The time series shown in the following analyses refer to the year of the observation; thus, the income refers to the previous calendar year. That is, the most recent measure used here is from 2007 and gives the annual income as of 2006. Due to the sweeping changes in the income distribution in the early years after the end of the GDR, annual incomes for the East German subsample of the SOEP can only be provided starting with income year 1991. Thus all time series on income, inequality and poverty give results based on West Germany only until 1991, and results for unified Germany thereafter.[12]

11 Finally, it should be noted that all of the following analyses refer to the population in private households only, i.e., we exclude individuals living in institutions such as nursing homes.

12 All empirical analyses have been conducted using Stata, Version 9.2. For the analyses of inequality, we drew heavily on add-ons for measurement and decomposition of inequality and poverty by subgroup as provided by Philippe van Kerm (CEPS/Instead) and, Stephen P. Jenkins (Univ of Essex).

3.1 Incidence and Relevance of IR and CI

The "incidence" of a given income component is simply measured by the share of individuals receiving a given income component (here IR and CI), whereas the "relevance" of IR and CI is defined as the percent of each in baseline income. Figure 2 reveals that by and large, there is a rather stable share of about 40 % of the population receiving IR. There is an expected dip after German unification caused by the considerably lower share of owner-occupiers in the new federal states of East Germany. Similarly the share of individuals receiving some type of capital income ranges between 80 and nearly 90 % over the entire period, with a slight reduction in the years since 2000.

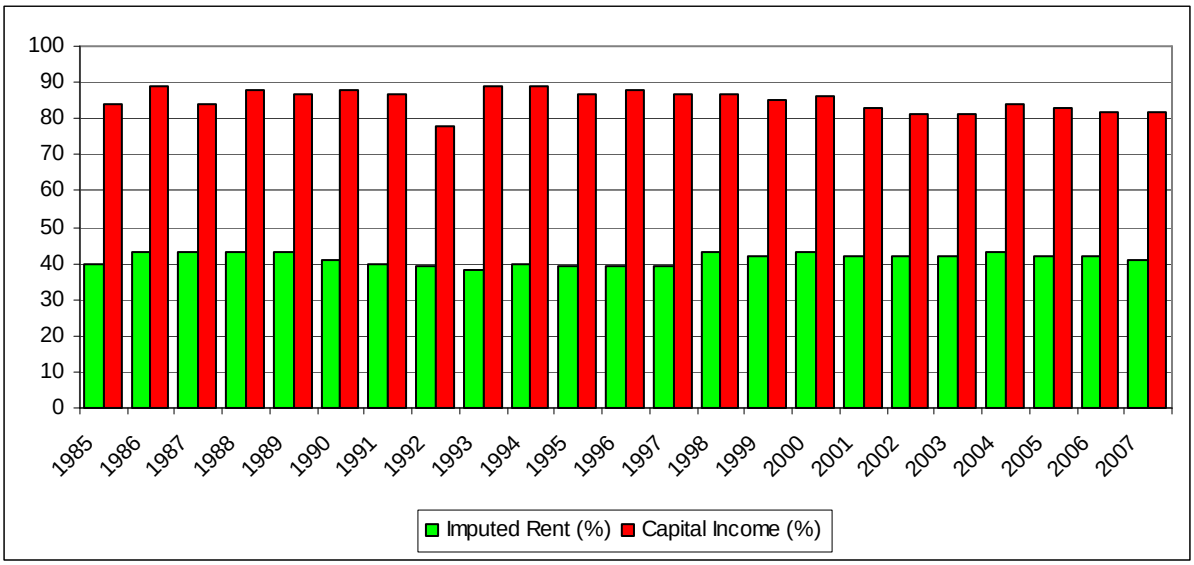
Obviously, these figures do not reveal how much of a given income source a person actually receives. Thus, Figure 3 gives the relevance of both income sources as a share of our augmented equivalent annual post-government income. Separating IR and CI from the baseline income reveals that these two components doubled from the mid-1980s to 2007. This is true in absolute as well as in relative terms. For example, IR as a share of baseline disposable income went from 2.9% in 1985 to more than 5% in 2007; similarly, the relevance of CI increased from 3.4% to 5.7%. Finally, it should be noted that although the incidence of imputed rent is lower than that of capital income, it constitutes a larger fraction of income among the households who receive IR, since the percentage of total income is similar for capital income and imputed rent.

Analyzing the incidence of the two components across baseline income quintiles shows very little variation in the distribution of beneficiaries from IR over the income hierarchy (see Table 1 below), while the beneficiaries of CI are clearly more concentrated at the top of the distribution. This pattern is even more pronounced when looking at the relevance, thus the share of income coming from the respective components. When moving up the income ladder, the amount of equivalent income derived from CI is less than 500 euros among households in the first quintile in 2007, while this value is five times higher among households in the top quintile.

The rise in magnitude of both income components is in line with macro-statistics revealing a clear reduction in the share of GDP coming from labour income (this share peaked in 1993 at almost 68% and sunk to 61% in 2007, see Frick & Grabka 2008).

Figure 2: Incidence of Capital Income and Imputed Rent in Germany, 1985 to 2007

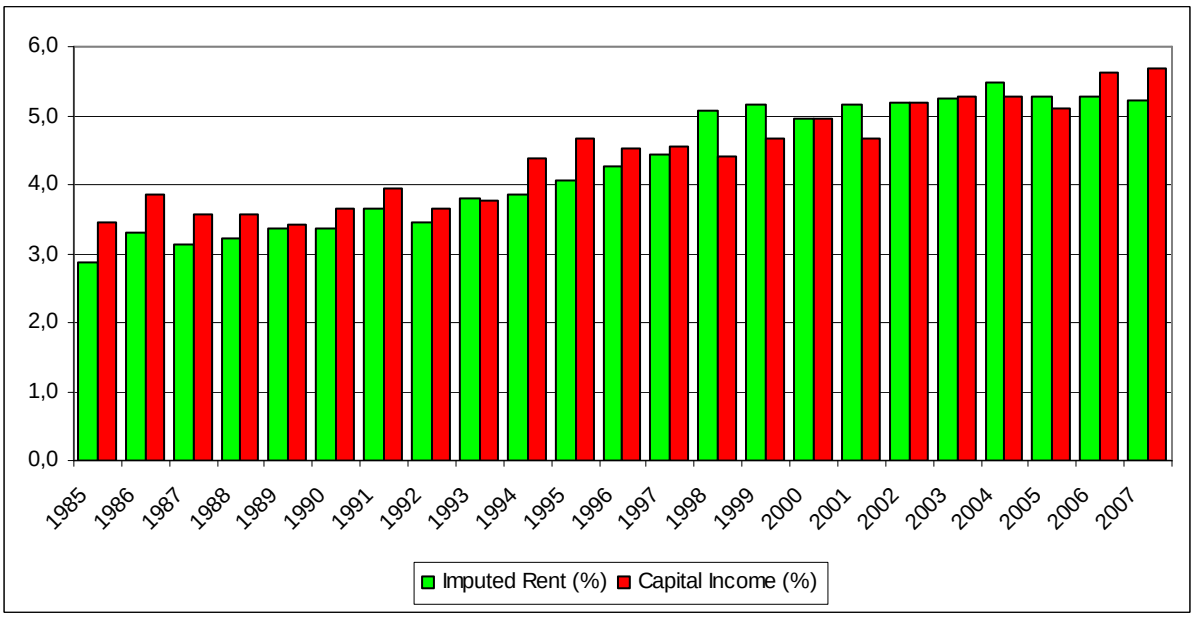
Population share holding CI and IR (in %)



Note: Population: individuals in private households. Up to 1991 West Germany only.
Source*:* SOEP 1985-2007

Figure 3: Relevance of Capital Income and Imputed Rent in Germany, 1985 to 2007

CI and IR as a share of total disposable income (in %)



Notes: Population: individuals in private households. Up to 1991 West Germany only.
Source: SOEP 1985-2007

3.2 Income inequality

Turning to the effects of IR and CI on disposable income inequality, Figure 4 compares inequality indices (Gini and HSCV) for baseline income with those for augmented "full" income measures including IR, CI, and both at the same time.

We observe a consistent inequality-reducing effect arising from the consideration of IR which is in line with the literature (see e.g. Yates 1994 for the case of Australia, Frick & Grabka 2003 for the US, UK as well as Germany and Frick et al. 2009 for various EU countries), although one should keep in mind that our baseline income measure does not include capital income as typically is the case! The incorporation of IR into the baseline equivalent disposable income reduces income inequality according to the Gini coefficient by about 1-2% which appears related to the fact that the beneficiaries from IR are more equally distributed across the income distribution.[13] At the same time, the top-sensitive HSCV shows a considerably larger inequality reduction effect up to 5%, which is of the same magnitude when looking at the bottom-sensitive MLD. These somewhat stronger effects at the tails of the income distribution are the result of two aspects: homeowners in general tend to be higher up in the income hierarchy, however, due to the nature of the typical mortgage repayment schemes, the *net* IR measure—which we apply here—is supposedly more concentrated among the elderly, who are typically associated with somewhat lower baseline incomes.

A very different finding arises for CI, where disposable income inequality is clearly rising due to the inclusion of this income component which disproportionately goes to high earners. First, as expected, this increase is much stronger when looking at the top-sensitive HSCV than in case of the Gini. The respective relative changes are 3% to 6% for the Gini coefficient, while the relative change using the HSCV is about 10 times higher. Second, the change resulting from the incorporation of CI—although volatile—does increase over time. While the HSCV increased due to the inclusion of CI by about 10% to 20% in the eighties and nineties, this relative change has more than doubled in recent years. Obviously, omitting CI and IR from an extended income measure would severely bias long time series on income inequality in Germany.

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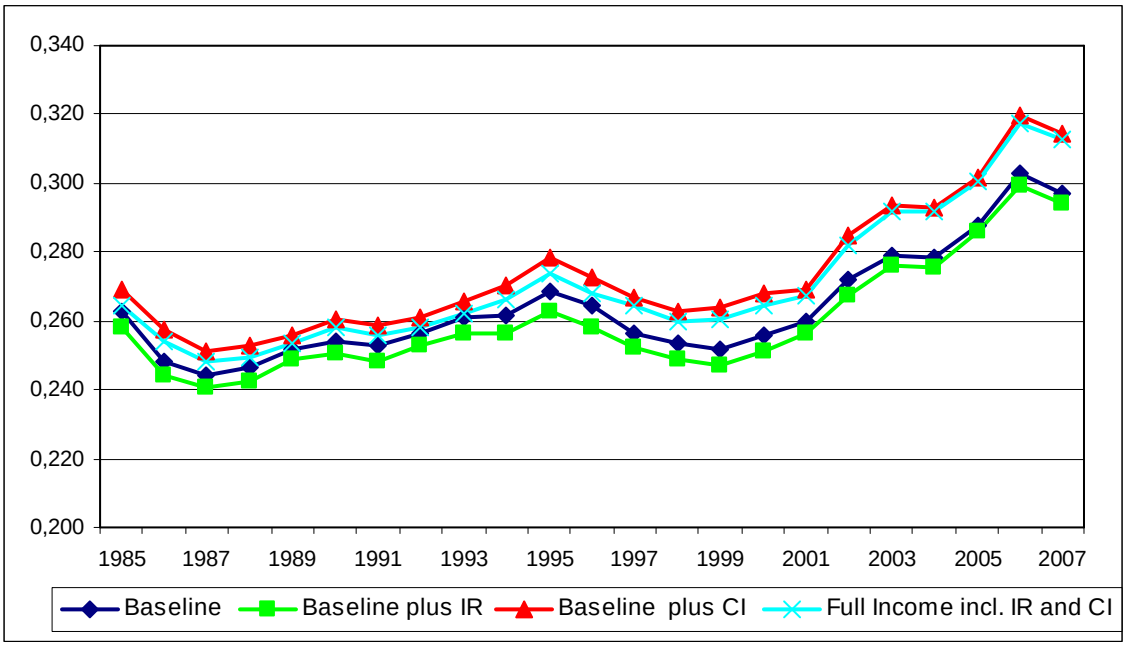
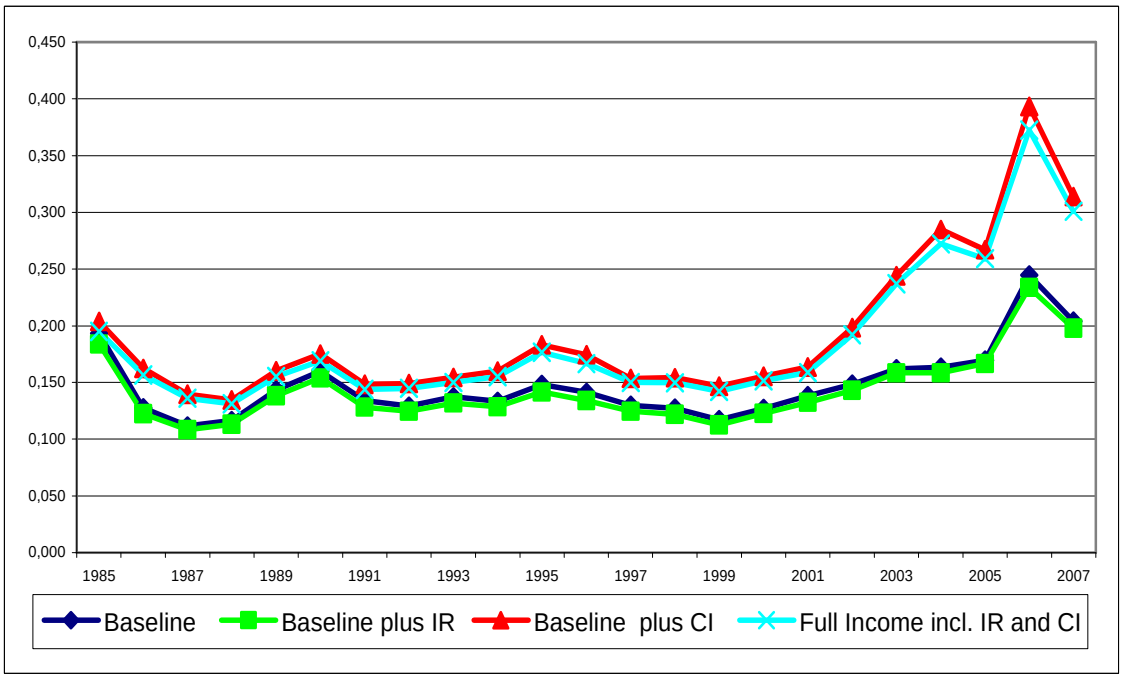
[13] However, this inequality reducing effect arising from the inclusion of IR may vary considerably with the share of individuals living in owner-occupied housing. According to Frick et al. (2009) the Gini coefficient drops by more than 5% when including IR in cases of Greece and Italy, where ownership rates are above 70%.

Figure 4: The Impact of Capital Income and Imputed Rent on Income Inequality in Germany, 1985 to 2007

Gini Coefficients



Half-Squared Coefficient of Variation (HSCV)



Notes: Population: individuals in private households. Up to 1991 West Germany only.

Source: SOEP 1985-2007

Summing up, income inequality in Germany has increased significantly from the mid-1980s to the most recent years. Using a comprehensive disposable income measure (including IR and CI), the Gini moves up from around .26 to more than .31. This increase in inequality has been paralleled by shrinking incomes among the middle class (see Grabka & Frick 2008). Irrespective of an overall inequality reduction effect arising from imputed rent, there was a massive pro-rich growth of capital income during the financial boom period of the late 1990s to 2007, which overall has yielded an increasing income concentration. This is confirmed by the even stronger increase in the top-sensitive HSCV measure which moves from .195 in 1985 to more than .300 in 2007.

3.3 Relative Poverty

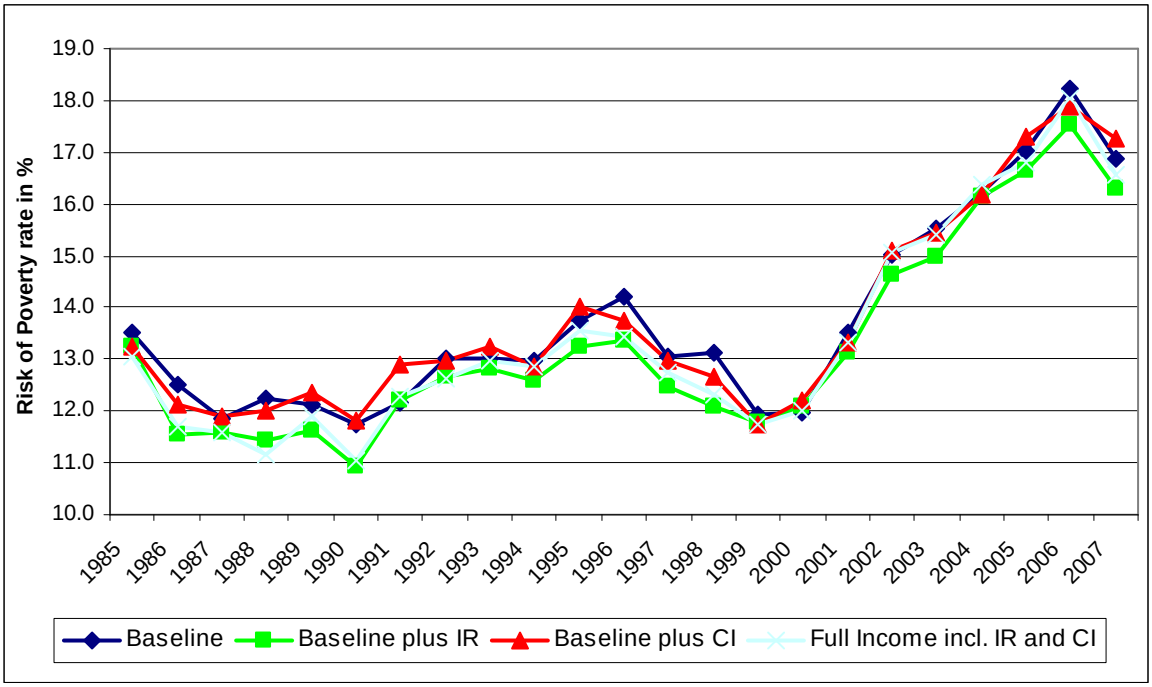
Throughout the period under investigation, and in line with the above-mentioned development of inequality, the relative poverty risk rate in Germany reached record levels in 2006 (about 18%), followed by a minor reduction in 2007, which was mainly due to improved labour market conditions and reduced unemployment in the economic upswing till 2008 (see Frick & Grabka 2008). In order to adequately show the effect on poverty of incorporating IR and CI into the income measure, we need to dynamically adjust the poverty threshold when including each of the aforementioned income components (see Figure 5).

With respect to the inclusion of IR, our results are strongly supportive of the inequality-dampening effect of imputed rent: the poverty reduction effect as measured by the change in the poverty risk rate (i.e., FGT0 in the top panel of Figure 5) is clearly visible during the eighties and nineties and levels off over the first decade of the new century. However, when giving more weight to inequality among the poor by applying the FGT2 index (α =2) in the lower panel in Figure 5, the reduction effect arising from IR becomes clearly more pronounced (around 20%).

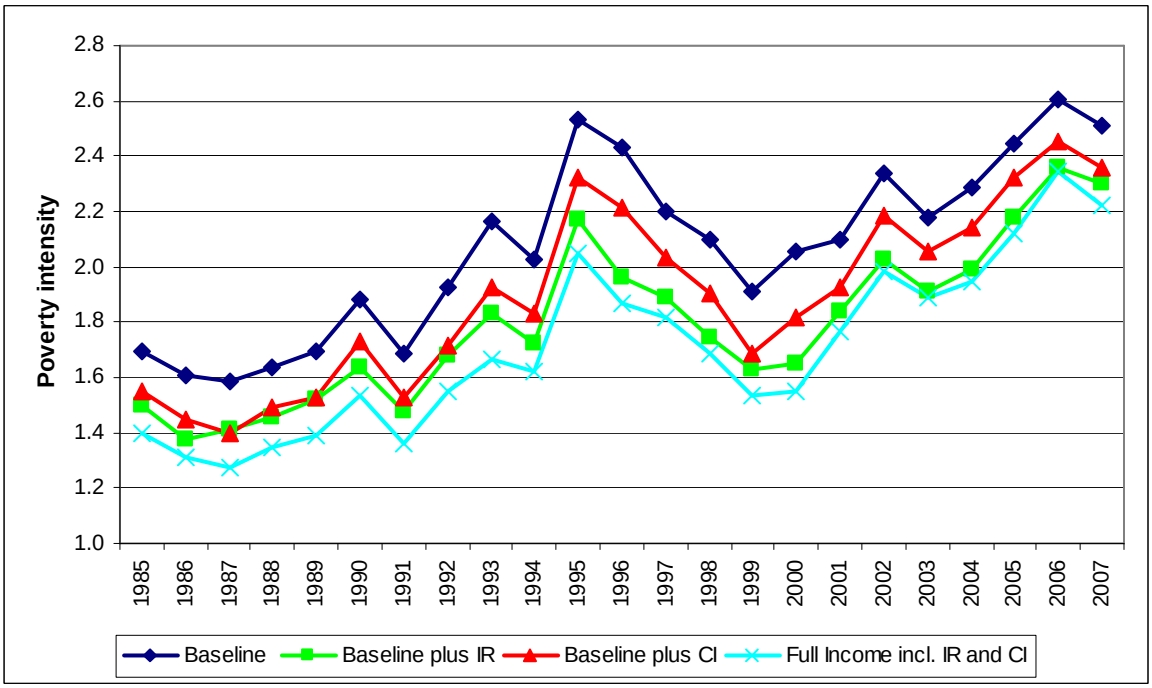
Including CI in the income measure does not show a similarly clear-cut picture with respect to the poverty head count ratio (FGT0), however, there is a more pronounced poverty-reduction effect increasing in α. The overall effect arising from including both, IR and CI, is a clear poverty reduction. However, it should be noted that these reduction effects appear to dwindle over time: for example, up to the end of the last century, the poverty-reduction effect for FGT2 was in the range of 20%, whereas this effect was only 10% in more recent years.

Figure 5: The Impact of Capital Income and Imputed Rent on the Risk of Relative Poverty in Germany, 1985 to 2007

Poverty risk rate (FGT0)



Poverty intensity (FGT2)



Notes: Population: individuals in private households. Up to 1991 West Germany only.
Relative Poverty Line at 60% of median equivalent income (PL is dynamically adjusted when including IR and CI, respectively)

Source: SOEP 1985-2007

3.4 Subgroup analyses

3.4.1 Investment income by income quintile and age groups

Having analysed these time trends on the basis of the entire population in private households, we now turn to the question of where in the income distribution these effects matter most, as well as which socio-economic characteristics are likely to be affected most by the inclusion of IR and CI. Thus, we compare the incidence and relevance of IR and CI across baseline disposable income quintiles (Table 1) as well as across age groups (Table 2). Due to the above-mentioned changes over time, we run these analyses separately for 1997 and 2007.

While the share of the population with IR is modified only slightly across baseline income quintiles, there is a pronounced positive relationship between CI and baseline income (see top panel in Table 1). For both income components, we see that these relationships become stronger from 1997 to 2007.

Adding IR and CI to baseline income (second panel in Table 1) and analysing the relative change shows for 1997, each of the two components adds about 5% to baseline income, although this increase is much stronger among the poorest quintile (plus 20% once we add IR and CI), whereas the richest quintile increases its baseline income only by less than 10%. However, for the latter, this is due to the higher baseline income and masks the fact that the absolute average amount of IR and CI added in each quintile is in principle positively correlated with baseline income. The only exception appears to be the very lowest income group: this is most likely a reflection of the higher probability of poor people enjoying the fictitious income advantage of subsidized social housing, which is included in our measure of IR. When looking at the absolute figures for CI and IR, one observes that in 1997, the highest income quintile had 1.7 times more investment income than the poorest quintile, and that by 2007 this ratio had more than doubled, showing the former to have 3.5 times more investment income than the latter (€4,208 vs. €1,183).

Table 1: The Impact of Imputed Rent and Capital Income by Baseline Income Quintile

	1997		2007	
	Population Share (%) holding ...			
Quintile	**IR**	**CI**	**IR**	**CI**
1 (bottom)	38	69	35	60
2	37	86	38	76
3	37	91	42	86
4	42	95	44	91
5 (top)	42	95	49	96
All	39	87	41	82

	Equivalent Income (Euro)							
Quintile	**Baseline**	**IR**	**CI**	**IR & CI**	**Baseline**	**IR**	**CI**	**IR & CI**
1 (bottom)	7140	724	726	1450	6661	690	494	1183
2	11638	625	386	1012	11468	778	581	1359
3	14416	681	461	1142	14871	879	627	1506
4	17937	815	834	1650	19466	1055	1012	2067
5 (top)	27467	995	1524	2519	31826	1548	2659	4208
All	15714	768	786	1554	16856	990	1075	2064

	Income from IR & CI as a % of Baseline Income							
Quintile	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**
1 (bottom)	/	10.1	10.2	20.3	/	10.4	7.4	17.8
2	/	5.4	3.3	8.7	/	6.8	5.1	11.9
3	/	4.7	3.2	7.9	/	5.9	4.2	10.1
4	/	4.5	4.7	9.2	/	5.4	5.2	10.6
5 (top)	/	3.6	5.5	9.2	/	4.9	8.4	13.2
All	/	4.9	5.0	9.9	/	5.9	6.4	12.2

	Income Share (%)							
Quintile	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**
1 (bottom)	9.1	9.3	9.0	9.1	7.9	8.1	7.7	7.8
2	14.8	14.8	14.5	14.4	13.6	13.6	13.1	13.1
3	18.4	18.4	18.0	18.0	17.7	17.7	17.1	17.2
4	22.9	22.8	22.6	22.7	23.1	23.0	22.7	22.6
5 (top)	34.9	34.7	35.9	35.8	37.8	37.6	39.4	39.3
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: Population: individuals in private households. Income in 2000 prices. Up to 1991 West Germany only.
Source: SOEP 1997 and 2007

The lowest panel in Table 1 reports the share of overall income held per income quintile for each of the four income specifications: While in 1997 the poorest fifth of the population had only 9.1% of baseline income, the richest possessed over 34.9%. Adding IR to baseline income made the distribution slightly less unequal, whereas adding CI again increased the inequality somewhat. Considering both components of property income at the same time yielded more or less the same picture. Apparently, for all indicators shown in this table, there is a consistent change from 1997 to 2007 towards rising inequality. This can be exemplified

by the even more pronounced increase in CI among the highest income groups, the reduced (increased) share of property income among the poorest (richest), and finally by the fact that in 2007, 39.3% of full disposable income was in the hands of the top 20%, as compared to only 37.8% of baseline income.

Table 2 reports similar information for age groups rather than for income quintiles. There is the expected positive relationship between the probability of enjoying IR and age—with the exception of the youngest age group: their somewhat higher share of IR recipients does not so much reflect early homeownership as it does young adults still living with their parents. On the other hand, we do not find a strong correlation between age and the probability of getting returns on CI (top panel of Table 2).

Table 2: The Impact of Imputed Rent and Capital Income by Age Group

	1997		**2007**	
	Population Share (%) holding ...			
Age group	**IR**	**CI**	**IR**	**CI**
less than 25	35	86	34	79
25-<40	28	88	25	82
40-<50	38	88	36	83
50-<65	49	89	54	82
65 and more	53	87	61	83
All	39	87	41	82

	Equivalent Income (Euro)							
Age group	**Baseline**	**IR**	**CI**	**IR & CI**	**Baseline**	**IR**	**CI**	**IR & CI**
less than 25	14320	529	583	1112	14865	619	675	1293
25-<40	16130	468	465	933	16803	527	583	1109
40-<50	17642	675	853	1528	18445	668	1036	1704
50-<65	17130	1061	1222	2283	19881	1428	1442	2871
65 and more	14027	1324	999	2323	15254	1810	1788	3598
All	15714	768	786	1554	16856	990	1075	2064

	Income from IR & CI as a % of Baseline Income							
Age group	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**	**Baseline**	**Baseline plus IR**	**Baseline plus CI**	**Full Income incl. IR & CI**
less than 25	/	3.7	4.1	7.8	/	4.2	4.5	8.7
25-<40	/	2.9	2.9	5.8	/	3.1	3.5	6.6
40-<50	/	3.8	4.8	8.7	/	3.6	5.6	9.2
50-<65	/	6.2	7.1	13.3	/	7.2	7.3	14.4
65 and more	/	9.4	7.1	16.6	/	11.9	11.7	23.6
All	/	4.9	5.0	9.9	/	5.9	6.4	12.2

Notes: Population: individuals in private households. Income in 2000 prices. Until 1991 West Germany, only.
Source: SOEP 1997 and 2007

Nevertheless, for those with IR from owner-occupied housing, we see the well-known strong increase in that type of income across age groups, which simply reflects the degree to which mortgages are paid off and equity is increased. For example, in 1997, 25-40-years-olds had €468 in IR on average, while those aged 65 and over had about three times this amount (€1,324). In line with a standard age profile of wealth, the absolute amount of CI peaked among the 50-65-year-olds (1997: €1,222) and diminished slightly in the oldest cohort (€999) due to dissaving and transfers to younger generations, among other things. However, considering both types of income together, the oldest enjoy the highest average amount of (all types of) investment income. Comparing again the situation in 2007 with the situation ten years earlier, it appears that the oldest profited most from the aforementioned increase in inequality: while considering IR and CI pushed baseline incomes of those aged 65 and over up 17% in 1997, their incomes rose further to almost 24% in 2007, compared to a much lower impact among the middle age groups.

3.4.2 Inequality decomposition by subgroup

The extent to which these differences across subgroups impact on income inequality can be assessed by means of inequality decomposition analysis. Based on the mean log deviation (MLD), which exhibits the necessary criteria of being an additively decomposable inequality measure, Table 3 gives the respective results for decomposition by household/family type, socio-economic status of the household head as well as by individual age. The latter appears to be an important structural variable in light of our hypothesis on the increasing relevance of returns on private investment (i.e., CI and IR) as an alternative income source in old age. As such, in order to provide evidence of possible changes over time, we repeat this analysis for the years 1997 and 2007.

The inclusion of IR and CI increases the baseline income measure by about 10% in 1997 and by more than 12% in 2007. This increase however is not evenly spread, but clearly over proportional among the elderly (especially due to IR), for individuals living in households headed by pensioners (due to IR) and by self-employed (mostly due to CI). Again, young adults who are still living at home profit from their parents' IR and CI (due to the standard assumption of pooling and sharing of resources across all household members). In line with the results mentioned in earlier sections, all those effects are much stronger in 2007.

With respect to inequality the change induced by investment income in the overall MLD is 15.6% in 1997 and 47.4% in 2007. While this huge change may be an indication for the volatility of CI, it is perfectly in line with the general increase in inequality in Germany over this period which is strongly related to massive unemployment (Frick and Grabka 2008). One of the advantages of inequality decomposition by subgroup is the opportunity to evaluate changes of within- and between-group inequality, here caused by the incorporation of both sources of investment income. In general, we find that within-group inequality increases significantly when considering returns on private investments in absolute as well as in relative terms. On the other hand, the contribution of between-group inequality declines when considering investment income – and it drops even in absolute terms when decomposing by household / family type. This is mostly driven by the fact that households with elderly heads (aged 60 and over), who represent about one-quarter of the population, exhibit a rather low baseline inequality. In 2007, the MLD for this group was 0.151 compared to 0.204 in the overall population; however, for the full income measure, the MLD was 0.314 as compared to 0.301—this over-proportional change causes the share of aggregate inequality that can be attributed to this group to increase from 18% in the baseline model to 26% in the full model. In contrast, in 1997 this group did not change its contribution to overall inequality when comparing baseline and full income. Similarly, persons in households headed by a self-employed person who make up less than 8% of the population in both years, contributed only 7% to aggregate inequality in 1997, but to more than 13% of aggregate inequality in 2007. In other words, for all subgroups where we observe an above-average incidence of investment income, the within-group inequality also shows an above-average increase over time, outweighing changes in inequality across groups.

4 Conclusions

There have been a number of papers seeking to explain the general trend of increased income inequality in the majority of the OECD countries. While many of these papers discuss (structural) changes in the labour market and earnings as well as in the population as the driving forces behind income inequality, this paper focuses on the scope and structure of investment income. This type of income not only consists of monetary capital income (such as interest and dividends), but should also include fictitious returns from investments in real estate (imputed rents). We demonstrate the separate impacts of these two types of investment in-

come, but also provide evidence underscoring the need to consider their joint impact Our definition of IR follows a regulation by the European Commission, which is currently being used to harmonize the income measurement for the European Statistics on Income and Living Conditions (EU-SILC) in Europe.

Using representative microdata from the German SOEP, the incorporation of capital income and imputed rent (for owner-occupied housing as well as for rent-free and otherwise subsidized tenants) into the measure of investment income clearly indicates the increasing relevance of these income sources for economic inequality in Germany over the last two decades. While the two components can be commonly defined as returns on alternative private investments (CI = return on financial investments, IR = return on investments in owner-occupied housing), they do not necessarily coincide with respect to their impact on income inequality and poverty. We find that, in line with the literature, whereas IR tends to exert a dampening effect on inequality and relative poverty, CI tends to accentuate inequality. In recent years, as the German public pension scheme has proven itself ever less capable of maintaining people's living standards into retirement, we find these effects to be of increasing magnitude.

Both incomes, IR and CI, are strongly related to age. In case of *net* IR—the most prevalent means of old-age provision outside the public pension system—this effect simply results from the increasing share of outright ownership among the elderly. For CI, there is a savings-related accumulation of capital in higher age groups, supported by the increased probability of inheritances around the age of 50 to 60. This process again yields higher financial returns, such as interest and dividends—however, one should also consider that the investment behaviour of the elderly most likely is more risk-averse due to the smaller chances for recuperating from large financial losses by means of alternative incomes.

Another important issue from a social policy standpoint is that income decomposition by subgroup confirms the established fact for most western countries that private investment in owner-occupied housing is a very effective means of reducing the risk of old-age poverty as well as inequality (see Zaidi et al. 2006). Thus any age-related income analysis will be biased if the fictitious income advantage arising from owner-occupied housing was not considered. This argument will be of much more relevance when performing cross-country comparisons where different structures of housing tenure will affect the magnitude of this income component over the whole income distribution.

Summing up, the analyses presented here make a clear case for the joint consideration of all components of private investment income (this should also systematically include income from private pensions, which are currently included in our baseline income measure) for the purpose of welfare analysis, be they of a monetary or non-monetary nature. This appears to be relevant in at least three dimensions of comparative research: (1) across time; (2) across space and welfare systems, thus also accounting for differences in the incentive structure to choose from different sorts of private investments (e.g., self-employed vs. dependent employed employees); and (3) across the individual life course, thus analyzing the impact of investment income on intrapersonal mobility patterns. Obviously, the panel nature of the data used in this paper, will help to address the latter point in future research. Against the background of ageing societies and a shift from the PAYG old-age pension systems to increased private coverage—in non-liberal welfare regimes in particular—returns on investment income are likely to yield higher levels of income inequality in the near future.

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Table 3: The Inequality Decomposition by Subgroup

	1997							2007						
	Pop. share in %	Increase in mean equiv. Inc. due to IR & CI (%)	Mean Log Deviation (MLD)		Change in ine-quality due to IR & CI (%)	% contribution to aggregate inequality		Pop. share in %	Increase in mean equiv. Inc. due to IR & CI (%)	Mean Log Deviation (MLD)		Change in ine-quality due to IR & CI (%)	% contribution to aggregate inequality	
			Baseline	Including IR & CI		Baseline	Including IR & CI			Baseline	Including IR & CI		Baseline	Including IR & CI
Household / Family type														
Single <=60	9.1	12	0.1789	0.2671	49.3	12.5	16.2	10.7	9	0.2086	0.3826	83.4	10.9	13.6
Couple no kids <=60	13.6	8	0.1060	0.1179	11.2	11.1	10.7	14.1	10	0.2549	0.3335	30.8	17.6	15.6
HH with children up to 17	38.7	7	0.1332	0.1482	11.2	39.7	38.2	36.9	8	0.1865	0.2339	25.4	33.7	28.7
HH with adult children	15.4	9	0.1012	0.1113	10.0	12.0	11.4	13.8	11	0.1766	0.2440	38.2	11.9	11.2
HH head aged >60	23.2	15	0.1088	0.1259	15.7	19.5	19.5	24.5	23	0.1513	0.3135	107.2	18.2	25.5
% Within-groups inequality	./.	./.	0.1231	0.1440	17.0	94.9	96.0	./.	./.	0.1978	0.2950	49.2	96.9	98.0
% Between groups inequality	./.	./.	0.0067	0.0060	-9.8	5.1	4.0	./.	./.	0.0064	0.0059	-7.2	3.1	2.0
Socioeconomic group of HH head														
Blue collar worker	19.8	5	0.0567	0.0597	5.4	8.7	7.9	16.9	6	0.0651	0.0704	8.1	5.4	3.9
White collar worker	33.8	8	0.1090	0.1169	7.3	28.4	26.3	35.2	8	0.1234	0.1426	15.6	21.3	16.7
Self-employed	7.1	15	0.1393	0.1542	10.7	7.6	7.3	7.9	18	0.3315	0.5115	54.3	12.8	13.4
Unemployed	7.6	7	0.1080	0.1087	0.6	6.3	5.5	7.6	5	0.1756	0.1901	8.3	6.6	4.8
Pensioner	23.7	17	0.1071	0.1645	53.5	19.6	26.0	23.5	22	0.1184	0.2199	85.8	13.6	17.2
Other	8.0	9	0.1476	0.1549	4.9	9.0	8.2	8.8	15	0.2928	0.7147	144.1	12.7	21.0
% Within-groups inequality	./.	./.	0.1098	0.1295	17.9	84.6	86.3	./.	./.	0.1720	0.2669	55.2	84.3	88.7
% Between groups inequality	./.	./.	0.0200	0.0205	2.9	15.4	13.7	./.	./.	0.0321	0.0340	5.9	15.7	11.3
Age of HH member														
Below 25	26.9	8	0.1352	0.1496	10.7	28.0	26.8	25.7	9	0.1919	0.2441	27.2	24.2	20.8
25-<40	23.4	6	0.1059	0.1092	3.0	19.1	17.0	19.8	7	0.1509	0.1722	14.2	14.6	11.3
40-<50	13.9	9	0.1169	0.1401	19.8	12.5	13.0	16.5	9	0.1696	0.2958	74.4	13.7	16.2
50-<65	19.8	13	0.1422	0.1778	25.1	21.7	23.5	18.8	14	0.2765	0.3757	35.9	25.5	23.5
65 and more	16.0	17	0.1225	0.1418	15.8	15.1	15.1	19.2	24	0.1524	0.3149	106.6	14.3	20.1
% Within-groups inequality	./.	./.	0.1259	0.1459	15.9	97.0	97.2	./.	./.	0.1978	0.2938	48.6	96.9	97.6
% Between groups inequality	./.	./.	0.0039	0.0041	5.6	3.0	2.8	./.	./.	0.0064	0.0072	12.3	3.1	2.4
ALL	100.0	10	0.1298	0.1501	15.6	100.0	100.0	100.0	12	0.2042	0.3010	47.4	100.0	100.0

Notes: Population: individuals in private households. Up to 1991 West Germany only.

Source*:* SOEP 1997 and 2007