Connecting the functional and personal distribution of income
Evidence from German Socio-Economic Panel Data

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Abstract

Using data for Germany from the German Socio-Economic Panel as well as from the Federal Statistical Office, we examine the interplay between changes in the functional distribution of income and the distribution of pre-government income among households within the timespan from 2002 to 2008.

We approach the implications of changes in the functional distribution of income upon the distribution of income among households via a simple theoretic framework that assumes pronounced concentration of income from asset flows among households and a positive relationship between households’ levels of pre-government income and their respective income shares from asset flows.

The motivated framework is widely confirmed by the data. Results suggest that the relative rise of income from asset flows, which on a highly aggregated perspective is provided by German National Accounting Statistics (profit share of national income), is also evident in the data taken from the German Socio-Economic Panel.

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Summary

How extensive are the effects of the distinct shift in the functional distribution of income upon the personal distribution of income among individuals?

Using data for Germany from the German Socio-Economic Panel as well as from the Federal Statistical Office, we examine the interplay between changes in the functional distribution of income and the distribution of pre-government income among households. The investigation is based on annual data covering the timespan from 2002 to 2008.

The aim of the paper is to clarify the implications of changes in the functional distribution of income upon the distribution of income among households via a simple theoretic framework that matches two assumptions: (1) pronounced concentration of income from asset flows among households as well as (2) a positive relationship between households’ levels of pre-government income and their respective income shares from asset flows.

The motivated framework is widely confirmed by the data. Results suggest that the relative rise of income from asset flows, which on a highly aggregated perspective is provided by German National Accounting Statistics (profit share of national income), is also evident in the data taken from the German Socio-Economic Panel, however, changes are much less pronounced.

In particular, the findings offer a more distinct interpretation of the dynamics of the distribution of pre-government income when decomposing relative income shares by different social subpopulations, such as civil servants, self-employed, white-collar employees or blue-collar employees.

The implications of the theoretic predictions are further strengthened as the concentration of pre-government income among households has increased within the examined time-span and the development of pre-government income has varied considerably for different subpopulations.
The distribution of income has been a central topic within the economic literature as well as in social and political debate. As changes in the distribution of income imply alterations of the relative income position of different social groups the phenomenon is closely connected to issues of social welfare or social justice with regard to income inequality. Against this background one can easily understand that the rising profit share reported in German National Account statistics (GNAS) since the beginning of the last decade has been subject of political debate (see Horn et al., 2009; Krämer, 2010; Schäfer 2010).

The relevance of changes in the profit share with regard to the personal distribution of income has often been motivated via changes within the functional distribution of income reported by National Account Statistics. However, it is the personal distribution of income that is relevant for social issues that focus on income inequality. Therefore, National Account Statistics are of little help when discussing income inequality as a facet of social justice. Besides this, the links between the functional distribution of income and the distribution of income among individuals are often implicitly exploited in a rather pragmatic manner paving the way for misinterpretation (see Dauderstädt, 2010; Krupp, 1967).  

The goal of our paper is to shed light on the effect of a rising profit share – that corresponds to a change in the functional distribution of income reported by GNAS – upon the development of the distribution of individual market income – which is supposed to capture

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3 For example, Dauderstädt (2010) identifies a rising profit share with an aggravation of the distribution of income among individuals: “Die funktionale Einkommensverteilung zwischen Löhnen und Gewinnen hat sich seit längerer Zeit in der EU mit Ausnahme weniger Länder verschlechtert.” However, such statements may be questioned in two respects: first, changes in the functional distribution of income reported in National Account statistics do not clearly reflect changes in the structural composition of average market income of individuals. Second, it is also the concentration of capital income within the population that determines the effects of changing profit shares upon the distribution of income among individuals. For example, in Japan, the functional income distribution is strongly tilted towards capital, and yet the country has one of the world’s most equal personal income distributions (see Aretz et al., 2009: 49).
the personal distribution of income. The latter will be approximated by micro data taken from the German Socio-Economic Panel (GSEP).

We will not address the driving forces that lay behind the pronounced shift of income shares reported in GNAS. Among other factors, rising profit shares (exceeding regular fluctuation patterns over the business cycle in the short run) are predominantly ascribed to the consequences of technological change as well as to the effects of globalization with regard to tightened competition in factor markets. For a discussion of these issues see, for example, Aretz et al. (2009), Horn et al. (2008), Krämer (2011) and Rodrik (2007) as well as the references cited therein.

Our examination takes to steps: First we contrast the profit share reported by German National Account Statistics that treats labor earnings of self-employed as capital income with the share of capital income for the entire working population based on micro data taken from the GSEP. Second, we approximate rising capital income shares on the basis of the income structure of individuals and compare different social groups.

The paper is structured as follows: Based on micro data taken from the GSEP (described in section 2) we take a look at the development of changes in the functional distribution of income as suggested by German National Account Statistics (section 3). Next, we clarify the effects of rising capital income shares upon the distribution of individual market income on the basis of a simple theoretic framework (section 4) and match the theoretical implications with structural changes within the market income of different social groups (section 5). Section 6 examines the respective changes over times. Finally we sum up and conclude (section 7).

2 Data

Our empirical analysis is based on micro data from the German Socio Economic Panel as well as data from the German National Account Statistics. We focus on the time-span from 2002 to 2008. The starting point of the year 2002 is motivated through the availability of a high-income sample that comprises households with a monthly income above 18.000 euros. Our examination period ends in 2008 as the newest income information was collected in 2009 in a retrospective manner and therefore offers the most up to date data for the year 2008. For our time-series analysis income is measured in real terms, prices correspond to the CPI of the year 2005.
3 Functional distribution of income reported by GNAS

The concept of the functional distribution of income contrasts labor income with profit income. Both income shares sum up to 100 percent of national income. Figure 1 (left panel) illustrates the pronounced increase of the profit share that has taken place within the time-span from 2002 to 2008. The profit share rises from 27.8 percent in 1992 to 34.6 percent in 2008. Within the years from 2002 to 2008 the profit share rose by 6.2 percentage points. The increase of the profit share accelerated in 2005, but dropped in 2008 due to the consequences of the financial crisis. Figure 1 (right panel) illustrates yearly growth rates of national income as well as profit and labor income. In 2008 profits declined, while labor income still grew.

Figure 1: Functional distribution of income (German National Account Statistics).


4 Development of individual capital income based on GSEP

Although this rise of the profit share based on GNAS has regularly been part of political debate that is supposed to cover issues of income inequality among individuals or households, it is not easy to draw clear conclusions from the phenomenon described above. In particular, one cannot directly compare National Account Statistics to a functional structure of income approximated via micro data taken from the GSEP (see below). The capital income share reported in the GNAS can hardly be interpreted as return to the production factor capital. It is rather a residual, encompassing both measurement errors

4 It has been argued that the increase in the 1990’s was mainly due to the adoption process in former Eastern Germany with its traditionally high labor income share, while the increase in Western Germany was relatively weak (see, e.g., Aretz et al., 2009).
(e.g. considering depreciation) and income categories which are not capital income in the strict sense (i.e., measurable flows of capital income to private households), as for example central bank profits or earned but not distributed corporate profits (see Krämer, 2011; Ryan, 1996). As a consequence, individual market income cannot be aggregated clearly to national income of the economy.

Despite these classification problems we compare the development of the profit share taken from GNAS to changes in the (functional) structure of individual market income and, in a seconds step, approach the consequences of rising shares of capital income for the distribution of income among individuals.5 Thereby, individual market income is approximated by the sum of individual capital income (from leasing and dividends) and individual labor income.

This information is collected in the GSEP dataset. Information about labor income is taken from the variable I11110, which represents individual labor earnings (including job-related extra payments such as Christmas bonus income and profit-sharing income) for both employees and self-employed. Capital income in our calculations is the sum of two: DIVDY, which represents income from interest and dividends, and RENTY, which represents income from rental and leasing. As household members often pool their assets, both capital income variables are only available at the household level.6

As proposed by GNAS, we first summarize individual capital income of all people and labor income of self-employed to aggregate capital income. The capital income share is derived as the ratio of this aggregated capital income divided by the sum of individual labor income and capital income. In addition to this we calculate a modified capital income share that provides a better starting point to examine the interplay of functional and personal aspects of the distribution of income. The modified capital income share differs from the concept that is used in GNAS as it classifies the income of self-employed persons in the same way as the market income of employees.

Figure 2 contrasts the development of capital income shares taken from the GSEP with the profit share provided by GNAS. Year on year changes and cumulative changes are presented in table 1.

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5 Although the concept of disposable income plays a central role in inequality research we focus on market income. The question of adequacy of market income in contrast to measures of disposable income in this context is addressed in Ryan (1996: 111).

6 For a detailed documentation of the GSEP variables see Grabka (2010).
Within the time-span of the years 2002 to 2007 an increase of the capital income share is also evident in the GSEP-data. However, compared to GNAS the changes are much less pronounced. The GSEP capital share rose from 25.2 percent in 2002 to 26.7 percent in 2005. In contrast to GNAS it declined already in 2006 and reached 26.1 percent in 2008.\(^7\) The modified capital share has also increased from since 2002 (from 14.5 percent) but peaked in 2007 at 16.4 percent. As labor income of the self-employed is not included in the denominator of the modified capital share, the latter is on average about 11 percentage points below the capital income share that resembles the GNAS profit share.

### Table 1: Profit share (GNAS) and capital income shares (GSEP).

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit share (GNAS)</th>
<th>Capital income share (GSEP)</th>
<th>Modified capital income share (GSEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Share in %</td>
<td>Δ in perc. points</td>
<td>Cumulative change</td>
</tr>
<tr>
<td>2002</td>
<td>28.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>29.2</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>2004</td>
<td>32.0</td>
<td>2.8</td>
<td>3.6</td>
</tr>
<tr>
<td>2005</td>
<td>33.3</td>
<td>1.3</td>
<td>4.9</td>
</tr>
<tr>
<td>2006</td>
<td>35.3</td>
<td>2.0</td>
<td>6.9</td>
</tr>
<tr>
<td>2007</td>
<td>35.7</td>
<td>0.4</td>
<td>7.3</td>
</tr>
<tr>
<td>2008</td>
<td>34.6</td>
<td>-1.1</td>
<td>6.2</td>
</tr>
</tbody>
</table>


As changes of the capital income share and the modified capital income share in the GSEP-data hardly differ in their directions, the increase in the labor income of the self-employed\(^7\) The decline from 2005 onwards primarily reflect the relative rise of the labor income share due to economic upswing 2005-2007 and its positive effects upon the labor market. 7
(which is attributed to profits and investment income in the GNAS) does not explain rising profit shares in the GNAS-data. The latter rather corresponds to a structural shift within the average individual market income. This shift, however, is much less pronounced than GNAS indicates.

5 Theoretical links of capital shares and the distribution of market income

How a rising capital income share transmits into the distribution of individual market income depends (1) on the concentration of capital income and (2) on the relationship between the share of capital income and the level of market income. Figure 3 (upper panel) illustrates the first aspect via three cases of concentration (A, B, C). The boxes represent the income structure of individuals.

- Case A represents an identical income structure of all individuals. Changes in the functional distribution of income do not alter the personal distribution of income.

- Case B contrasts two extreme types of income structure. Individuals are supposed to exclusively earn labor or capital income. Changes in the functional distribution of income lead to strong changes in the personal distribution of income.

- Case C combines the rather extreme setups A and B. Here, the (more realistic) assumption is that individuals gain both, income from labor and income from asset flows. However, the shares differ among individuals.

Figure 3: Types of the functional distribution of income.
Besides this, one has to take into account the relationship between the level of individual market income and the share of capital income. The lower panel of figure 3 therefore contrasts two possible cases (both special cases of C).

- From a negative relationship between the level of individual market income and the respective share of capital income (case C1), one would expect a declining concentration of market income among individuals resulting from a rise in the average share of capital income.

- In contrast to this, in case of a positive relationship (case C2), one would expect rising capital income shares to cause an increase in the concentration of individual market income.

### 6 Distribution of capital income shares among different social groups

These theoretical considerations are supposed to be examined empirically on the basis of micro data taken from the GSEP (see figure 4). Both relationships are presented for the entire population, the working population, self-employed people, civil servants, white-collar employees and blue-collar employees.

The left panels approximate the first theoretical relationship presented in figure 3. The average capital income share (vertical axis) is illustrated for different subpopulations ranked by their respective shares of capital income (horizontal axis). Complementarily, we report the labor income share, as both shares sum up to 100%. Note, that this representation does not consider the level of individual market income and only addresses the aspect of income structure heterogeneity.

The right panels show the structural composition of individual market income in absolute levels (left scale) as well as the share of capital income (right scale) ranked by the level of individual market income. This approximation corresponds to the second theoretical relationship presented in figure 3.

Considering the overall population, a low market income is associated with a high capital income share. As the lower part of the market income distribution mainly consists of pensioners and unemployed, this is little surprising. These subpopulations have no or little
labor income, so that even a low capital income yields a high capital income share. As a consequence, the capital income share steadily decreases up to the ninth decile group.

However, the situation is different with regard to the working population. We observe a weak U-shaped relationship between market income and the capital income share: For low labor incomes at the left margin of the income distribution, even small levels of capital income lead to a relatively elevated capital income share. Towards the middle of the income distribution absolute capital income stagnates or only grows at low rates, while labor income grows at a much higher rate. This relation inverts in the upper half of the income distribution, where moving to the next decile group is associated with a higher percentage increase in capital income than in labor income. Hence, the capital income share has its minimum in the middle of the income distribution.

Considering the whole working population, the capital income share is lowest for the sixth decile group. The same holds for the subpopulation of the self-employed. For blue-collar and white-collar workers the turning point is at a higher point of the market income distribution (seventh decile group), whereas for civil servants the increase in the capital income share already starts in the fourth decile group.

Regarding levels, the capital income share clearly is highest for the self-employed – it is about twice as high as the mean of the working population. In contrast, civil servants and blue-collar workers have capital income shares slightly below the mean.

Within the different subpopulations of the working population variances are relatively small. The capital income share is close to the subpopulation’s mean for most decile groups. Ignoring the lower and the upper decile group, the range of the capital income share never exceeds six percentage points. For employees the range is even lower, and there is hardly any difference among decile group four to seven. Only for the upper decile group this picture of relative homogeneity is interrupted. For the working population (as well as for each of its subgroups), the capital income share of the tenth decile group is more than twice as high as the one of the previous decile group.
Figure 4: Capital income share and level of market income.

Note that the ranges (scaling of the axis) are identical for all panels, except in two cases within the right panels: the capital share (right axis) for the whole population ranges from 0 to 100 percent. In any other cases the maximum capital share is set to 40 percent. Further, the level of income (left axis) ranges from 0 to 100,000 Euros except in case of the self-employed. Here, the range goes up to 200,000 Euros.

Source: GSEP, own calculations.
Next, we focus on the development of capital income (levels and shares) as well as on the concentration of capital income and market income over time. Again, we examine the time-span of the years 2002 to 2008 and compare different social groups. Figure 5 therefore illustrates the average shares and levels of capital income in the left column. The right column shows the development of GINI indices for capital as well as market income.

In general we observe that changes in the levels of capital income go along with similar changes of capital shares. In contrast to the whole population variations over time are less pronounced for the working population, though the course is pretty much the same. For the self-employed we observe a pronounced rise of average capital income, peaking in 2005. As already illustrated in figure 4, this group is characterized by the highest levels of capital income as well as capital income shares. Civil servants’ capital income levels and shares are comparable to white-collar workers and are very close to the average of the whole working population. In contrast to other groups, civil servants’ capital income levels and shares peak in 2004 and decline steadily afterwards. Blue-collar workers are characterized by comparably low levels and shares of capital income.

Now we match the information of varying capital income levels and shares with the change of concentration of market income measured by the GINI coefficient (right column). A summary of the changes in concentration is provided in table 2. For the whole population we observe increasing concentration of market income until 2005 but a decrease of income inequality from 2006 to 2008. The working population is characterized by a rising concentration of market income. In particular, the further increase of the GINI coefficient from 2007 to 2008 is remarkable as levels and shares of capital income as well as the concentration of capital income fall at this time. A similar development is observed for the self-employed. However, as mentioned before, changes are more pronounced. In contrast to this, civil servants’ market income concentration – following the development of the respective capital income shares – peaks in 2004 and decreases afterwards. For white-collar workers market incomes’ GINI coefficient shows a similar pattern as the capital income shares of this group. We observe a concentration peak in 2007, but a clear decline in 2008 which is not in line with the development of the whole working population at this time. For blue-collar workers the concentration of market income follows the changes of capital income shares.
Figure 5: Share and concentration of capital income and concentration of market income.

The scaling of the left axis (average capital income) in the first column is identical except for the self-employed and workers. Note that the ranges for the average capital share (scaling of the right axis) vary depending on the subpopulation. For the graphs in the right column there is no adjustment of scaling. Therefore, the developments have to be read with caution.

Source: GSEP, own calculations.
Table 2: Concentration of individual capital income and individual market income.

<table>
<thead>
<tr>
<th></th>
<th>Capital Income</th>
<th>Market Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GINI range trend 02-08 (abs.)</td>
<td>trend 02-08 (rel.)</td>
</tr>
<tr>
<td>Total population</td>
<td>0.013</td>
<td>0.003</td>
</tr>
<tr>
<td>Working population</td>
<td>0.013</td>
<td>0.006</td>
</tr>
<tr>
<td>Self-employed</td>
<td>0.075</td>
<td>0.050</td>
</tr>
<tr>
<td>Civil servants</td>
<td>0.059</td>
<td>-0.050</td>
</tr>
<tr>
<td>White-collar workers</td>
<td>0.027</td>
<td>-0.019</td>
</tr>
<tr>
<td>Blue-collar workers</td>
<td>0.034</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Source: GSEP, own calculations.

7 Summary and conclusion

Our analysis illustrates that the increase of the profit share that is reported in GNAS is also evident in our approximation on the basis of micro data taken from the GSEP. However, the rise of the capital income share is less pronounced.

Our theoretical considerations that connect changes in the structure of market income to the personal distribution of income are confirmed by the data and suggest rising inequality of market income among individuals as a consequence of increasing capital shares.

With regard to the total working population the variations within the time-span from 2002 to 2008 are comparably small. However, we find remarkable changes within the income structure of self-employed persons as well as civil servants that coincide with changes in the concentration of the respective distribution of market income.

References


