Asking Flexible Disaggregated Income Gross or Net Figures vs Single Total Question: Evaluation from Panel on Household Finance

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Issues in Income Measurement

- Issue in survey collection of income is how many questions are needed
- Single question vs. multi-questions
- Usually more questions yields more income (SIPP vs CPS vs ACS)
- But it is costly
- And there is a need to determine disposable income
### Comparison of US Income Surveys

<table>
<thead>
<tr>
<th>Income Estimate</th>
<th>CPS</th>
<th>ACS</th>
<th>SIPP</th>
<th>PSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Persons</td>
<td>22,893</td>
<td>22,854</td>
<td>20,514</td>
<td>25,710</td>
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<tr>
<td>Family Income Quintile</td>
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<tr>
<td>Lowest</td>
<td>6,513</td>
<td>6,526</td>
<td>6,962</td>
<td>7,178</td>
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<td>Second</td>
<td>13,789</td>
<td>14,259</td>
<td>13,355</td>
<td>15,261</td>
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<tr>
<td>Third</td>
<td>19,293</td>
<td>19,576</td>
<td>17,946</td>
<td>21,132</td>
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<tr>
<td>Fourth</td>
<td>25,604</td>
<td>25,496</td>
<td>23,250</td>
<td>28,785</td>
</tr>
<tr>
<td>Highest</td>
<td>49,316</td>
<td>48,543</td>
<td>41,062</td>
<td>56,220</td>
</tr>
<tr>
<td>Ratio of fourth to lowest</td>
<td>3.93</td>
<td>3.91</td>
<td>3.34</td>
<td>4.01</td>
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<tr>
<td>Ratio of highest to lowest</td>
<td>7.57</td>
<td>7.44</td>
<td>5.90</td>
<td>7.83</td>
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</tbody>
</table>
Comparing Monthly (single question) to Annual (50 questions) in CPS
1st concern in collecting income information
Who knows net vs gross

- Most surveys only ask either gross or net income values (esp gross) - item-nonresponse can be high resulting in imputation bias:
  - the average wage earners are more aware of the net employment income through their bank statement
  - collective bargaining typical in Germany wage reduces the likelihood for wage earners to remember the gross figure
  - wage earners in the top distribution know their gross income better
  - above-average self-employment income earners are more likely to answer the gross figure
2nd concern in collecting income information – is many better than one

• Micklewright and Schnepf (2010): the total recall question is cheaper and the item-nonresponse may be lower

• Microlevel evidence suggests a mean-reversion of the income reporting errors. In USA: the bottom reports more income and top less than benchmark estimates

• Hokayem, Bollinger and Ziliak (2015) treat both income from either external (administrative data) or internal (supposedly superior questions) as possible “truth” – can we use both
Goals of paper

- Use (PHF) Panel on Household Finance survey
- Examine respondents answer to income questions using different accounting periods (e.g., annual, quarterly, monthly or other specific ones) and gross or net figures—among many flexibilities
- Develop tax calculator to convert the gross and net figures bilaterally which considers complexities in the German tax- and social insurance contribution system.
- Document the conversion infrastructure and the quality: low item-nonresponse and good comparsion with benchmarks.
Goals of paper

• Evaluation 1: to access data quality, establish a counterfactual environment - all of our respondents answering the net figures would have yielded an item-nonresponse for the same income in the counterfactual design – the traditional survey only asking gross figures.

• Evaluation 2: a micro-level evaluation between single total and derived aggregate (net) income.
What paper finds

• Evaluation 1 – Use only gross responses: counterfactual distribution does not always shift up as predicted by the pattern to report net or gross in the bottom: shifting down in the bottom around the area of basic

• Evaluation 2 – Compare single and aggregate: the single total value is usually less than the derived aggregate net figure while the former can be much higher than the latter in the bottom of distribution:
  – single total income response for those with positive tax liability in survey can be similar to the report towards tax authority.
The flowchart of tax conversion program

Preparatory imputation

Time conversion

Auxiliary parameter production

Looping over all the income variables subject to income tax and social insurance contributions

Reported to be gross or net

Married

Single mother

No

No

Tax class=I and reported net income

Net

Gross

Yes

Tax class=II and reported net income

Candidate tax class=III/IV/V and reported net income

Derived net income under candidate tax class=III/IV/V

Gross to net calculator

Net to gross solver

Derived tax class

Derived or reported gross income under candidate tax class=III/IV/V

Gross income when married

Gross income when only subject to capital income

Net to gross calculator

Net

Gross

Looping over all the income variables subject to capital income tax

Reported to be gross or net

Gross income when single
1. The observed income components are converted one by one to the gross figures under all possible tax classes he/she can apply.

2. In determining the couples to choose between III/V and IV/IV classes, determine the optimal tax class.

3. We assign the gross figure, as produced in the first step, to each variable which is associated with the optimal tax class.
Comparison of distribution of taxpayers to actual tax records
Success of evaluation

- Traditional Survey Response
- Counterfactual using only gross reports
Evaluation 1 - Households or persons reporting net value as % of respondents for each decile and each variable

Poor more likely to answer the net figures for employee and self-employment incomes

<table>
<thead>
<tr>
<th>Deciles</th>
<th>INCOME FROM FINANCIAL INVESTMENT</th>
<th>EMPLOYEE INCOME</th>
<th>INCOME FROM BONUS PAYMENT</th>
<th>SELF-EMPLOYMENT INCOME</th>
<th>INCOME FROM STATUTORY PENSION</th>
<th>INCOME FROM PRIVATE PENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41</td>
<td>60</td>
<td>52</td>
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<td>29</td>
<td>57</td>
<td>55</td>
<td>59</td>
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<td>3</td>
<td>27</td>
<td>56</td>
<td>42</td>
<td>46</td>
<td>74</td>
<td>65</td>
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<tr>
<td>4</td>
<td>52</td>
<td>43</td>
<td>53</td>
<td>47</td>
<td>78</td>
<td>74</td>
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<td>42</td>
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<td>78</td>
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<td>6</td>
<td>49</td>
<td>54</td>
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<tr>
<td>mean</td>
<td>37</td>
<td>48</td>
<td>48</td>
<td>38</td>
<td>71</td>
<td>57</td>
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<tr>
<td>p50</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>count (unweighted)</td>
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<td>3,089</td>
<td>1,452</td>
<td>640</td>
<td>1,950</td>
<td>439</td>
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</table>
Evaluation 2: Distribution of the relative percentage difference between single and derived total disposable income by the quintiles of derived total disposable income

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<tr>
<th>Quintiles of derived total disposable income</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
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<td>mean</td>
<td>9</td>
<td>-19</td>
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<td>-28</td>
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<td>-26</td>
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<td>p1</td>
<td>-162</td>
<td>-285</td>
<td>-177</td>
<td>-257</td>
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<td>p5</td>
<td>-67</td>
<td>-100</td>
<td>-96</td>
<td>-109</td>
<td>-253</td>
<td>-127</td>
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<tr>
<td>p10</td>
<td>-30</td>
<td>-52</td>
<td>-71</td>
<td>-80</td>
<td>-179</td>
<td>-80</td>
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<td>p25</td>
<td>-11</td>
<td>-23</td>
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<td>-37</td>
<td>-75</td>
<td>-34</td>
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<tr>
<td>p50</td>
<td>3</td>
<td>-12</td>
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<td>-14</td>
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<td>-13</td>
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<tr>
<td>p75</td>
<td>39</td>
<td>4</td>
<td>-2</td>
<td>-1</td>
<td>-9</td>
<td>3</td>
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<td>p90</td>
<td>70</td>
<td>24</td>
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<td>p95</td>
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<td>p99</td>
<td>100</td>
<td>51</td>
<td>45</td>
<td>40</td>
<td>33</td>
<td>89</td>
</tr>
</tbody>
</table>

- Single total question is less than aggregate - the average difference is -26%.
- Underreporting increases with quintiles of derived total disposable income.
Aggregate is greater than single
And difference larger for multi-adult HH
Conclusion

• This paper documents their microsimulation model that can accurately implement German income tax system.

• Evaluations:
  – comparing the distributions from ours and a counterfactual asking only gross incomes
  – comparing the difference between the disposable incomes derived by tax microsimulation and aggregation and the single self-reported one

• Both comparisons reveal the disagreements appearing to be correlated with the income tax schedule and become significant in most progressive area of the distribution.

• Problems exist at top and bottom of distribution
• How many questions for income
• Could you ask tax questions
• Why not link to tax data
• Compare tax model to tax data by component
• Test tax model on GSOEP or use GSOEP tax model (?)
• Try using a hybrid approach – using the “best” responses
• What about under-reporting
• EXTRA SLIDES
<table>
<thead>
<tr>
<th>Validation – national account</th>
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<tbody>
<tr>
<td><strong>Income taxpayers (assessment)</strong></td>
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<td>2009</td>
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<td><strong>Potential tax units total²</strong></td>
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<td>2009</td>
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<tr>
<td><strong>Estimated non-filers</strong></td>
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<td>1992</td>
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<td><strong>Taxpayers as percentage of potential tax units</strong></td>
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<td><strong>Population of age &gt;=20</strong></td>
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<td>1992</td>
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<td>2009</td>
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<tr>
<td><strong>Gross market income³</strong> (integrated data base, less capital gains)</td>
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<td>1992</td>
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<tr>
<td><strong>Primary income of private households⁴</strong></td>
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<td><strong>Gross market income as percentage of primary income private households</strong></td>
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<td><strong>Wage income (integrated data base)⁵</strong></td>
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<td><strong>Compensation of employees (national accounts)⁵</strong></td>
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<td>2005</td>
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<td><strong>Wage income from integrated data base as percentage of wages from national accounts</strong></td>
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<td><strong>Wage income from integrated data base as percentage of wages from national accounts</strong></td>
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<td><strong>Wage income from integrated data base as percentage of wages from national accounts</strong></td>
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</tbody>
</table>

³ Gross market income according to SOEP system
⁴ Primary income of private households according to national accounts
⁵ Wage income from SOEP system and national accounts

**Note:** The data in the table represent the validation of national account statistics. The figures provided are illustrative and may not reflect the exact values due to rounding and estimation methods.
## Validation – income tax statistics

<table>
<thead>
<tr>
<th>Brackets of total income (Summe der Einkünfte)</th>
<th>2010 wage and income tax statistics</th>
<th>PHF</th>
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<tbody>
<tr>
<td></td>
<td>Persons liable for tax</td>
<td>%</td>
</tr>
<tr>
<td>0(^1) -</td>
<td>5,000</td>
<td>7,725,718</td>
</tr>
<tr>
<td>5,000 -</td>
<td>10,000</td>
<td>5,486,101</td>
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<td>30,567</td>
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<td>1,000,000 oder mehr</td>
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</tr>
<tr>
<td>Sum</td>
<td></td>
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</tbody>
</table>
### Evaluation 2 - Distributions of single total vs derived aggregate between multi-adult or single person household and male or female respondents

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Female (1,596 cases)</th>
<th>Male (1,969 cases)</th>
<th>All</th>
<th>Single Derived sum</th>
<th>Single as % of derived sum</th>
<th>Single Derived sum</th>
<th>Single as % of derived sum</th>
<th>Single Derived sum</th>
<th>Single as % of derived sum</th>
<th>Single Derived sum</th>
<th>Single as % of derived sum</th>
<th>Single Derived sum</th>
<th>Single as % of derived sum</th>
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<tbody>
<tr>
<td>5</td>
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- Recall and aggregating bias <= larger impact on the multi-adult households than the single ones except some bottom percentiles AND underreporting is almost always increasing with income
Validation – other surveys

<table>
<thead>
<tr>
<th>Decile</th>
<th>Thresholds from PHF</th>
<th>PHF</th>
<th>EU-SILC</th>
<th>GSOEP</th>
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**Overall:**

- **Median**: 18,758, 18,678, 18,586
- **Mean**: 22,148, 21,264, 21,223
- **Gini**: 32.81, 29.26, 29.10
Evaluation 2- Relative difference between single and derived total disposable income (vertical axis) vs derived total gross income (horizontal axis) in the subsamples classified by quintiles of derived total disposable income

Averagely more underreporting in all the quintiles except the first one.

Fifth quintile shows the most serious underreporting and the first one shows the other extreme.

Deviation seems to correspond well with the evolution of local progression: the fitting line drops most sharply where marginal tax rate starts to pick up from the zero in the first quintile subsample and where marginal tax rate starts to become flat in the last quintile subsample. These two areas have the strongest local progression according to German tax schedule.
Evaluation 1 - Distributions of net income as derived sum - benchmark versus counterfactual

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<tr>
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<th>Benchmark</th>
<th>Counterfactual</th>
<th>Counterfactual as % of benchmark</th>
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