Assessing economic inequality with tax data - Switzerland from 1945 to 2010

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Abstract

There is empirical evidence that economic inequality increased in the majority of western countries over the last decades (OECD, 2011; Gornick and Jäntti, 2013). In Switzerland, however, the development is unclear, as there is only little systematic evidence about income inequality that would allow for long-term comparison. Studies on the distribution of wealth are even scarcer. Nevertheless, income inequality has been a prominent theme in the public Swiss discussion in recent years, e.g. the most recent referendums "Abzockerinitiative" and "1:12-Initiative". We address the mentioned gap by presenting a long and consistent time series of inequality measures for income and wealth (1943-2010) calculated from federal tax statistics. We describe the benefits and shortcomings of tax data compared to other data sources and present strategies to handle tax data specific methodological difficulties. In the end we integrate the case of Switzerland into the international picture of inequality development showing parallels and deviations.

I. INTRODUCTION

Economic Resources can be seen as central indicator for life chances in general and a multitude of outcomes like physical and mental health, life expectancy and crime in particular (Wilkinson and Pickett 2009). While the study of social inequality can be considered as one of the core subjects of sociology in more recent years the concern about the widening gap was addressed by global leaders (WEF 2013) and scholars alike. Empirical evidence acknowledge the supposed trend that economic inequality increased in the majority of western countries over the last decades (OECD, 2008, 2011; Gornick and Jäntti, 2013). The pattern of evolution suggests a polarization, which can be referred to as the "hollowing of the the middle class" (Alderson and Doran 2013). Households are moving towards the top and the bottom of the distribution relative to the past, which

is especially problematic as the middle class can be seen as the core of western democracies or as it is stated by Stiglitz (2012,117): "our democracy is being put at peril."

Given the importance of the subject a constant reflection about reliability of empirical data seems appropriate. Atkinson (2013:8) observes advances in technology and methodology which improves the core sources of inequality research, the household surveys. On the other hand the labor intensive and expensive surveys around the world are subject to budget cuts and the instrument itself faces problems in form of low response rates, which affects the assessment of inequality undisputedly. These concerns have led to the search of alternative data sources, which can supplement the established survey data studies. Already Kuznet (1955) used tax data to examine the relationship between economic

growth and personal distribution of income. Then it took several decades until Piketty (2001,2003) made the use of tax data fashionable again. Following his approach studies on several countries were conducted (Atkinson and Piketty 2007, 2010). Today, all existing top income tax statistics based time series are collected and accessible through the world top incomes database (Alvaredo et al. 2014).

What is known about Switzerland so far? Among the European Nations Switzerland can be situated in the middle-field when looking at inequality of disposable income (EU-SILC,Eurostat (2013)). Nevertheless in recent years Switzerland experienced an ongoing political debate about the distribution of income in general and the widening of the gap between low and top earners. The debate went along with referendums trying to regulate the market outcomes. Whereas the "Rip-Off-Initiative" (Abzockerinitiative) found a surprisingly high majority of 68%, the 1:12-Initiative, which aimed at the whole spectrum of the income distribution, was rejected. The voting about the minimum wage-initiative will be held on 9th February 2014. All these referendums questioned the current distribution of income and were accompanied by a broader discussion about the development of income inequality held in the media. Several official and semi-official publications addressed the question of rising inequality in Switzerland.

The most recent official figures published by the Swiss Federal Statistical Office (2013) show stability concerning the income distribution covering the time period of 1998 until 2011. The authors found a slight increase in the primary income which endured until the recent crisis. This temporary increase was mainly compensated by governmental redistribution. A longer period is covered in the LIS-Data-set (1982-2004).[1] Analyzing these data Gornick and Jäntti (2013) found for Switzerland a quite substantially decreases in income inequality, contradictory to the development in most other western countries. This result is supported by Grabka and Kuhn (2012) analyzing the Swiss Household Panel (2000-2009).

Whereas the aforementioned publications focused on disposable household income from survey data, the revival of tax-data-inequality studies lead to fruitful insights for Switzerland as well. Dell et al. (2007) used tax data from the Federal Tax Administration to assess the development of concentration of the highest incomes and wealth (top-shares). In contrast to most other examined countries, Switzerland did not experience a reduction in income and wealth concentration from the pre-First World War period to the decades following the second World War (up to 1996). Using the same approach Foellmi and Martinez (2013) expand the Dell et al. timeline to 2008 finding that the share of top income has risen, the top 0.01% share even doubled in the last observed 20 years. A result which opposes the outcome of official data published by the Swiss Federal Statistical Office.[2]

The divergence can be explained with several factors. First of all, different data sources were used. The official data providers trust on survey data, whereas the later mentioned publications use tax data. It is assumed that the coverage of top incomes is better in tax data than it is in survey data (non-respondent bias), which is a crucial issue concerning inequality.

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[1]Data-provider for the LIS Data is the Swiss Federal Statistical Office. The data is harmonized out of three surveys: Swiss Income and Wealth Survey (1982), Swiss Poverty Survey (1992) and the Income and Consumption survey (2000,2002,2004). The OECD-Database includes measures from Income and Consumption survey as well. Additional data for 2008 is available from EU-Survey of Income and Living Conditions (EU-SILC). This change in survey is considered as a strict break. Comparison before and since 2008 is not recommended (OECD 2012:315). All in all the LIS dataset contains the longest time series on inequality for Switzerland.

[2]There are other studies on Switzerland covering different periods but not the recent years. Flückiger et al. (2007) and also Jeitziner and Peters (2007,2009) report constant inequality from 1960-1996 respectively from 1995 to 2003. Covering a similar time period Bauer and Spycher (1994) and Bolzani and Abul Naga (2002) found decreasing inequality. On the other hand Buchmann and Sacchi (1995) and Ernst et al. (2009) found an increase in the 1980s.

On the other hand the focus on top income neglects other changes in the distribution of income as it is not possible to see, whether newer concerns like the "hollowing of the middle class" occurred in Switzerland or not, which leads to the second point. Different measure of inequality hampers the comparability. Third, different income concepts and different units of analysis were used. As it is shown by Modetta and Müller (2012) income distribution is strongly affected by governmental redistribution, reducing inequality substantially. With the focus on tax data the change in institutional settings is not covered. Also neglected is the household structure, whereas it is unclear how inequality is affected whether one looks at household income or at income of tax units. It can be assumed, that inequality corresponding to different concepts react differently on demographic change (change in household structure).

While there are several studies about income inequality in Switzerland, the publications concerning the distribution of wealth are scarcer, albeit the distribution of wealth seems to be a relevant dimension shaping the economic well-being of individuals as well. The cross-national Data center in Luxembourg is expanding their efforts, constructing the first cross-national wealth database. But, up to the day information for Switzerland is not available. Shorrock et al. (2013) unify several datasources (including tax data) to assess the pattern of global wealth. Their databook includes figures for Switzerland. In contrast to inequality of income concerning inequality of wealth Switzerland takes a leading position

Up to the day, Switzerland can be situated according to the actual level of income inequality in western societies as there is a huge effort to collect data which can be harmonized to comparable measures (see Luxembourg income study). However, it is unclear how the bias through non-response affects the overall measure of inequality. Likewise a long and consistent time-series allowing to identify and

explore development patterns on every point of the distribution (not only the top-shares) and a time series for inequality of wealth is missing. Building on recent developments in the field of inequality research, we assess the suitability of the publicly accessible tax data to report inequality and its changes over time. First of all this includes a discussion of the accessible measures in context of a reflection about the state of the art conceptualization of economic resources as an indicator for economic well-being. Second, we summarize and apply tax data specific technics to construct suitable measures of inequality. We expand the given set by an in depth discussion of a newly applied step to handle the incomplete coverage in tax data statistics. Third, we integrate the development of Swiss inequality into the international picture.

II. Measurement concepts, Data and Methods

To discuss the suitability of a specific data source it is crucial to have an idea about an ideal measure. Based on a review on the literature about the measurement concepts in an ideal world, we discuss briefly the advantages and shortcomings of tax data compared to other data sources - namely survey data. Afterwards we describe the tax data published by the Swiss Federal Tax Administration highlighting the important aspects, which have to be considered working with FTA-Data. In the last section, we describe the methods and corrections we used to construct the time-series of inequality-measure for income an wealth for Switzerland.

I. Standards for measuring economic resources and inequality

Concepts on measuring economic resources
Most studies on inequality focus on income inequality, while economic resources are ideally conceptualized with measures for income, wealth and consumption together.

Defining income

- Market income refers to revenue from employment.

- primary income or pre-transfer income refers to market income plus revenue from property (capital income)

- Brutto income refers to primary income plus social transfer

- Disposable income or posttransfer income refers to brutto income minus transfer paid

- adjusted disposable income refers to disposable income corrected for the numbers of household members

The appropriateness of the income concept is bound to the research interest. Studies focusing on labor market outcome look at market income. Studies focusing on human wellbeing follow the approach as propagated by the oecd (2013). This concept is largely implemented by the Federal Office of statistics. Following this concept one should look at income after taxes and transfers inclusive the adjustment for household members, because this is the measure which frames the consumption possibilities. Lastly, studies focusing on the effect of institutions (social welfare, taxation) compare the distribution of pre- and post-income measures.

Defining wealth While the apropiateness of the conceptualization of income is widely discuded, there is no agreed definition of personal wealth yet and the appropriate methods of valuation are not always clear. Wealth can be defined as the marketable value of financial assets plus non-financial assets (housing and land) less debts (Credit Suisse 2011:5).

Population Coverage
All Residents? Working Residents? Single Person vs household/family. Households without income
see for details: OCED Framework for Statistics on the Distribution of Houshold income, consumption and wealth (2013)

Measuring inequality and concentration
To be able to make qualifying statements about a distribution or to compare different distributions, the concept of inequality turned out to be the most appropriate and thus the most commonly used dimension. Vgl. Allison (1978), Engelhardt (2000), Cowell (2000) oder Hao/Naiman (2010)

neuere Indikatoren; Polaritätsindex: relative distribution methods in the Social Sciences (Handcock/Morris 1999)

Gini is mainly used for international comparison. However, other measures are often reported along (gini is more sensitive to changes in the middle of the distribution than to changes in the tails (OECD, 2008:37). Newer branches of inequality studies emphasize the need for broader measures of inequality, which allow better analyses about the change of inequality and namely statements about the area of change (downgrading/upgrading) (Alderson and Doran 2013).

Alvaredo (2010) shows formally, how top incomes shares are related to the gini-coefficient. Following his argument, it is crucial to consider top incomes. Leigh (2007) also analyzed the relationship between the Gini (and further inequality measures) and top income shares in a panel of 13 countries (Switzerland is part of the studie).

II. Comparison of tax data and other data sources - advantages and shortcomings

Summary of tax data drawbacks

- Misreporting of incomes (high earners have an interest in getting tax beneficial income see above)

- with aggregated data the adjustment for household members is not possible (no equivalization possible). This is a point,

which is hardly mentioned in the top-income literature, albeit it is a crucial issue in theorized concepts of income. To generalize one can say, that the concept of tax units (individuals and couples + no direct information about household members at least not in the aggregated tax tables) is not congruent with the concept of household. This might influence the overall inequality, taking into account the change from traditional household and family structures over the last century. This is an inequality related issue, where relevant studies are missing. What are the assumptions?

- the tax data income definition summarize labor income, capital income and taxable transfer payments (no means-tested benefits as welfare aid). Distinction between the different income sources is not possible, albeit the mechanisms of changes in the specific distribution can be very different.

- Some tax units are not included in the tax tables (see Foellmi and Martinez 2013:11f).(a) only taxed cases are included (partly a problem, for certain periodes we know how many cases are excluded because of low or none income) - (b) cases tax at source (Quellenbesteuerung). Foreign nationals living in Switzerland but with a yearly or any other temporary resident permit only. In some border-cantons the share of this group is very high (20%) (c) staff of international organizations based in Switzerland - (d) non-fillers show up in the tables as long as they are registred. This persons get an imputed income (older tax tax return and information given by employers. Not registered non- fillers are not in the records. - (e) tax evasion. Feld and Frey (2007) report about tax evasion in Switzerland, it should be somewhat above 20 percent on average. With the (strong) assumption that the pattern of tax evasion over time is stable, this is

a minor problem for inequaly measures over time.

Problems with household income surveys

- Sample data (bias)

- comparability between countries and over time (depends on income definition)

- short time series

Atkinson et al. (2009) estimate that CPS survey data fail to capture about half of the overall increase in inequality measured by the Gini coefficient, a result confirmed by Alvaredo (2010).

See for other countries: Siminski et al 2003 (Australia), Brewer et al 2008, UK, Burkhauser et al. 2009, US) The discussion about problems with reporting income is fairly exhaustive. What about wealth?

It is well recognized that the traditional sources of wealth distribution data are unlikely to provide an accurate picture of wealth ownership in the top-tail of the distribution. Credit Suisse (2011) makes use of the information in the "Rich Lists" published by Forbes Magazine to adjust the wealth distribution pattern in the highest wealth ranges.

Additonaly the Credit Suisse Reports states (2011:8) that these data my be less subject to response bias, but my be more prone to valuation problems, especially in connection with pension assets and debts.

III.   Tax data published by the Swiss Federal Tax Administration

- Datengrundlage: 1947/48 bis 1981/1982 Eidg. Wehrsteuer. 1983/1984 bis 2010 direkte Bundessteuer. Zugänglich über estv.admin.ch

- Special feature Switch from bi-annual taxation to standard annual tax-system (1995/1996 bis 2003)

- Tabulation by size of income and statistical measures from individual tax records (Brülhart-Daten)

- Income after deductions-¿ taxable income (employment income, business income and capital income). Is income definition stable over time? Yes it should. Realized capital gains are excluded from the definition. It includes income from employment, self-employment, capital income and taxable transfer payments. Plus Eigenmietwert,

- Reported on national and cantonal level

IV. Ways to tackle FTA-tax data specific problems

Incomplete coverage of the population (left censored data.) What can be done about the not-taxed? Del et al. (2007) impute for non-fillers the 20 percentage of the annual average income. This flattens the distribution on the left side, which is not a problem if you are interested in the top income shares, but it would surly affect overall measures of inequality. Furthermore Del et al. calculate the proportion of non-fillers by estimating the total of tax units out of the population records.

changes in taxation system (switch from annual to biannual taxation) In the mid-1990s a fundamental change in the Swiss tax system took place by switching form the two-years based praenumerando taxation to the one-year based postnumerando taxation. This change was enacted with a transitional period of several years, during which each canton could choose when to adopt the new system. This is why during the transitional period from 1995 to 2003 there is no uniform tax data published on the Swiss level but only data on the cantonal level (Foellmi and Martinez:8f).

Estimating percentiles from bracket income tabulation Pareto interpolation

Missing of mean-tested benefits as part of the income -¿ imputation with recommendation for minimum level for basic needs defined by the SKOS.

deductions Del et al. (2007:477): we can check with statistics for 1971-72 (as well as later years) presented both by size of income before deductions and income after deductions that adding back deductions does not introduce any significant error in our estimates. Gorgas and Schaltenegger (2011:5): ..., information on [] deductions is provided in the tax statistics, thus, we could add the personal deductions to the income data to obtain a consistent series over time. Können wir das auch? Zumindest für gewisse Zeiträume? Das wäre noch gut.

Studies on income try to focus on the disposable income, which subtracts certain expenditures from the primary income. Deductions reflect somehow compulsory expenditures and thus taxable income can be seen as a sort of pseudo disposable income. On the other hand deductions can affect the distribution. There are recent studies about the correlation of progressivity and deductions in Switzerland, which examines if deductions have a perverse redistribution effect by redistributing income from the lower middle class to the upper middle class (vgl. Peters 2011 and Interpellation Barbara Gysel (2009).

IV.1 Estimating the bias

For most of the observed range (1941 to 2010) we do not have any information how many tax units fall into the category of having income that is not zero but is too little to qualify for federal taxation (lets call those "zeros" for convenience) . However starting 1995, the FTA provides exactly this information for each canton. This enables us to estimate the bias we introduce for each canton and each period between 1995 and 2010. Consequently we can obtain information whether the bias is stable over time (which makes it possible to safely interpret the changes of inequality over time) and whether the bias is different for each canton. Unterschiede zwischen Kantonen wären gut um zu argumentieren, dass andere Länder auch davon betroffen sind, in etwa sowas wie "je höher der Steuerfreibetrag,

One can take a first look at the descriptives
plotting the share of zeros over time seperately
for each canton .
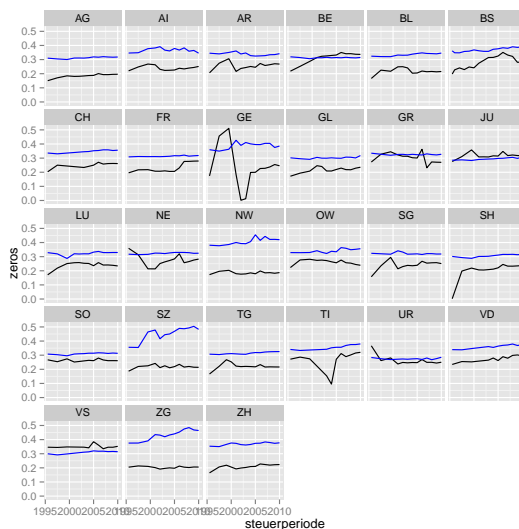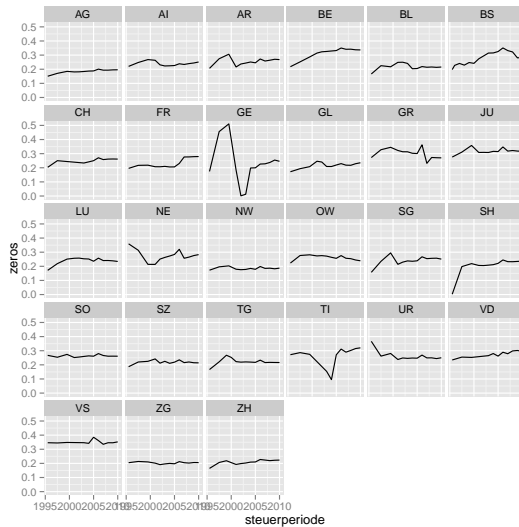
We can see multiple things here:

1. There is a small overall upward trend
   which we assume to be the Federal Ad-
   ministrations inflation adjustments to the
   tax threshold.

2. Geneva and Tessin show wild changes
   but those might be explained by the tax
   gap ("Bemessungslücke") that people ex-
   ploited when the cantons changed the tax
   system. It remains unclear however why
   we can't see similar patter within other
   cantons.

3. There is some variance and we see dif-
   ferent patterns over time and cantons.
   When estimating gini coefficients or the
   like we must therefore assume that ignor-
   ing "the zeros" leads to a bias that is not
   stable over time.

We might try two strategies to moderate
the problem:

1. Add the zeros as a seperate group

2. Fit a model to predict the inequality mea-
   sure (e.g. the gini coefficient) using the
   share of zeros as a predictor

By adding the zeros as a seperate group
we face several problems. With the exception
of Geneva 1995/96 Pareto interpolation of per-
centiles p20 and above seems viable. Low per-
centiles however would need to be extrapo-
lated so we might impose unrealistic assup-
tioms. Even when estimating "safe" measures
above p20 (better p50) or a gini coefficient we
need to make an assumption about the income
structure of that group (a distribution, a mean
income or zero-income). To be consistent with
the measure of "taxable income" we could as-
sume an income of zero for that group, calcu-
late gini coefficients and compare them with
the original (uncorrected/plain) version. To get
a rough number we could (cantonwise) check
the squared correlation between plain and cor-
rected gini.

The second approach however is more ro-
bust as we do not impose additional assump-
tions but instead exercise a little curve fitting.

The model outputs a teststatisic for each
canton that tells us whether the variation of
the zero-rate over time leads to a significant
deviation from the typical "canton gini-level".
As the model has a decent fit we are not in

great danger of omitted variable bias. Using a joint F-Test we can now test if all cantonzeros interactions are zero.

```
## Wald test for kanton:zeros
##  in lm(formula = G_steink ~ kanton + kanton:zeros + factor(steuerperiode) +
##      factor(steuerperiode):zeros, data = df)
## F =  3.282  on  27  and  262  df: p= 4e-07
```

In our case we can clearly reject the hypothesis that all interactions are zero. This leads to the conclusion that gini coefficients are biased by the variation of the zero-share which is kind of obvious but at the same time we can use the model to report adjusted gini coefficients. For example one might be interested in how inequality would had developed if the zero-share would have been constant over time. (Note RF: predict all data point using canton, time and the initial OR final zero-share to homogenize the time series) Furthermore we can quantify how large the bias is and we can do this seperately for tax periods or seperately for cantons.

For all cantons:

We can see the the model fit reduces to explaining 61.5% of the gini variation versus 92.6% when the information from the zero-shares was used. Although this so some extent attributable to the additional 26 paramters: this is huge.

The model indicates some cases that deserve more attention: Schwyz (positive coefficient) and Geneva (negative coefficient) and the tax period 2000 as well as the most recent periods.

```
## [1] -0.006575
## [1] -0.005752
## [1]  0.09164
## [1]  0.08027
## [1]  0.07055
## [1]  0.06316
```

A positive coefficient (e.g. Schwyz) can be read as follows: In periods with many zeros we measure higher gini coefficients. Our conclusion is that people with low income are more successfully hidden. If those people would

be taxed and therefore appear in the statistic they would sharply contrast the high income earners.

A negative coefficient (e.g. Geneva) means the more zeros there are the smaller the gini measure was compared to other tax periods within that canton (remember this is a fixed-effects model). This is less obvious than the Schwyz case and our reading is: more zeros mask inequality that arises from the bottom.

IV.2   Descriptives - where do we put this?

nice grapics for taxable income, reines einkommen and income after taxes here...
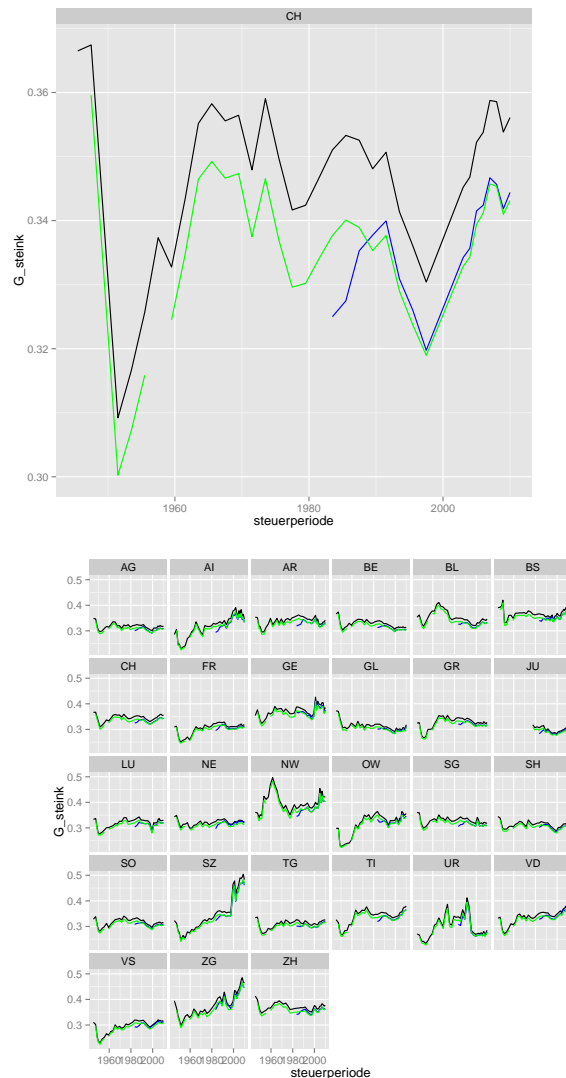
III. Results

Gesamtschweizer Grafik (mit imputierten Daten) einmal eine Linie mit Bias, einmal ohne Kantonsweise Grafiken Kuznets / U-Turn, Test der Hypothesen mit den final Daten. Der link zwischen rein deskriptiv und Theorie plus Modell ist aktuell noch ein krasser Drahtseilakt...

IV. Discussion

V. Acknowledgements

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References

[1] François Nielsen and Arthur S. Alderson. The kuznets curve and the great u-turn: Income inequality in U.S. counties, 1970 to 1990. 62(1):12–33. ArticleType: research-article / Full publication date: Feb., 1997 / Copyright © 1997 American Sociological Association.

VI. Appendix