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Income Inequality Considering the Cost of Living. An Admin-Data Approach Studying the Swiss Case

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Abstract: Cost of living is an important aspect of economic well-being, which is often neglected in inequality studies. Based on a Gini decomposition using admin data, this study estimates the relevance of minimum and average cost of living in Switzerland in relation to inequality and highlights the significance of direct taxes, everyday goods, housing, and health care premiums. Cost of living significantly increases disposable income inequality. Regional differences exist, which are primarily attributed to the design of welfare instruments.

Keywords: Cost of living, inequality, Switzerland, welfare state, admin data

Le coût de la vie et son impact sur l'inégalité des revenus. Une approche admin-data sur le cas de la Suisse

Résumé: Le coût de la vie est un aspect important du bien-être économique, qui est souvent négligé dans les études sur les inégalités. Basée sur une décomposition de Gini utilisant des données administratives, cette étude estime la pertinence du coût de la vie minimum et moyen en Suisse par rapport à l'inégalité et met en évidence l'importance des impôts directs, des biens de consommation courante, du logement et des primes de soins de santé. Le coût de la vie accroît sensiblement l'inégalité du revenu disponible. Toutefois, les différences régionales sont principalement attribuées à la conception des instruments de protection sociale.

Mots-clés: Coût de la vie, inégalité, Suisse, État providence, données administratives

Lebenshaltungskosten und deren Auswirkungen auf die Einkommensungleichheit. Eine Verteilungsanalyse unter Einbezug von Administrativdaten der Schweiz

Zusammenfassung: Lebenshaltungskosten sind ein wichtiger Faktor des wirtschaftlichen Wohlstands, der in Ungleichheitsstudien oft vernachlässigt wird. Auf der Grundlage einer Gini-Dekomposition unter Verwendung von Administrativdaten schätzt diese Studie die Relevanz der minimalen und durchschnittlichen Lebenshaltungskosten in der Schweiz aus einer Perspektive der Ungleichheit. Untersucht wird die Bedeutung von direkten Steuern, Gütern des täglichen Bedarfs, Wohnkosten und Krankenkassenprämien. Lebenshaltungskosten erhöhen die Ungleichheit des verfügbaren Einkommens signifikant. Regionale Unterschiede existieren, die in erster Linie auf die Ausgestaltung der Instrumente des Wohlfahrtsstaates zurückzuführen sind.

Schlüsselwörter: Lebenshaltungskosten, Ungleichheit, Schweiz, Sozialstaat, Administrativdaten

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1 Introduction[1]

Inequality studies usually focus on the distribution of income. The cost of living is often neglected, even though it is not incomes but the possibilities to consume that serve as the relevant benchmark for an economic welfare analysis (UN 2011; OECD 2013). Generally speaking, cost of living are living expenses of private households that are mandatory in a way as they are needed to make for a living. Expenditures for housing, health insurance premiums, direct taxes, and out-of-pocket expenses for daily necessities are regularly incurred costs that weigh heavily or lightly on household budgets, depending on a household's financial situation. While households have some leeway in how much they spend on living expenses like food, housing, or health insurance premiums, it is not possible to completely dispense with these costs. The cost of living is also linked to the place of residence. For instance, housing costs are strongly influenced by the regional housing market. Health insurance premiums, the system of premium reductions, and taxes also depend on the design of welfare state instruments. This might vary regionally, especially in strongly federal organized countries like Switzerland. Despite to the large number of studies on income inequality, little is known about the extent to which cost of living influences economic inequality. Against this background, our paper studies the importance of the cost of living from an inequality perspective by answering two research questions: How relevant are the costs of living for inequality analyses? How significant are regional differences in Switzerland?

The paper starts with an overview of existing studies in section 2, where it becomes evident that cost of living is an important component for inequality analysis. There are several studies that address specific issues but there are no studies that provide a holistic view from a distributional perspective. We, therefore, develop a procedure on how cost of living can be included in distributional analyses of inequality by introducing a minimal and an average cost of living scenario (section 3). Based on linked tax data of the year 2015 from six large Swiss cantons, which allow us to map the financial situation of about 45% of the Swiss working population, we assess the effects of the cost of living on the inequality of disposable income after cost of living is accounted for. More specifically, we quantify the effect of housing costs, health insurance premiums (including individual premium reductions), and direct taxes. We find strong increases in inequality of incomes comparing pre vs. post cost of living distributions between +10.9 (minimal) to +25.9 (average) Gini

1 The present study was conducted as part of the research program POVERTY AND INEQUALITY IN SWITZERLAND, which is mainly financed by the Swiss National Science Foundation (see https://inequalities.ch). Furthermore, the authors wish to thank two anonymous reviewers for the helpful comments during the review process.

points. Elements in the design of welfare instruments like taxes and the premium reduction system slow down these mechanics but reinforce regional differences within Switzerland (see section 4). We conclude that cost of living is an extremely relevant topic from a perspective of inequality which should receive more attention in research and policy alike (see section 5).

2 Cost of Living in Inequality Studies

2.1 Change of Cost of Living Over Time and Differences Within Countries – International Review of the Literature

Lately, research on the evolution of economic inequality has received much attention in many countries (Chancel et al. 2021). Yet, few studies address the importance of the cost of living. There are studies that highlight the importance of the implications of changes in prices across time. Argente and Lee (2021) argue that neglecting the prices of specific goods leads to misperceptions in the assessment of consumption opportunities and income inequality. They support their argument with an analysis of consumption data in the US, based on which they calculate income-dependent price indices for the years 2004–2016. In doing so, they find that annual inflation varied significantly by income class and exacerbated inequality, particularly in the aftermath of the 2007 financial crisis. Albouy et al. (2016) examined how developments in the US housing market have affected housing costs in recent decades. They show that low-income households are disproportionately affected by this development. Moreover, with inflation rising sharply in 2022 (OECD 2022), questions about the burden on households have increasingly come to the fore. To this end, Handrich (2022) calculated the income-related burden of additional expenditures for Germany as a result of inflation in 2022 based on a statistical model. According to the analyses, inflation hits low-income households the hardest. Households in the lowest decile have to pay 5.3% more of their net household income to afford the same standard of living as in the previous year, assuming a moderate inflation trend. For high-income households, the increase is significantly lower at 1.1%. Kröger et al. (2022) come to similar conclusions. Based on energy expenditure data for Germany, the authors find that rising gas prices, as a result of the war in Ukraine, affect low-income households disproportionately more than socioeconomically strong groups, and this, therefore, exacerbates inequality.

Some studies also point to the importance of regional differences within a country. Azzoni and Servo (2002) analyse wage inequality in the 10 largest metropolitan regions of Brazil in the 1990s. They use nominal and real wage data that

reflect cost-of-living differences through regional price indices. Accounting for the cost of living leads to a reassessment of income inequality across regions. Surinov and Luppov (2021) also developed a procedure for measuring income inequality adjusted for regional purchasing power and show for Russia that this is associated with a more equal distribution of household incomes overall. Finally, Hillringhaus and Peichl (2010) criticize the omission of expenditures when assessing inequality and poverty in Germany. Their analysis incorporates regionally divergent costs of living and points out that previous analyses overestimate poverty rates for northern, eastern, and western Germany and underestimate them for southern Germany. Generally, they find a reduction in income inequality when the analysis accounts for regional prices.

2.2 Switzerland-specific Literature

For Switzerland, no studies are available that include the cost of living from an inequality perspective. However, various reports point to the specific costs that are expected to be associated with income-related burdens and indicate where changes have occurred in recent years.

In the "Distribution Report 2020," Lampart and Schüpbach (2020) examine the change in the burden of expenditure in Switzerland for the period between 2000 and 2019. They emphasize that despite increases in lower and middle wages, the distribution of income has become significantly more unequal due to sharp increases in top wages until the financial crisis in 2008. This unequal distribution is exacerbated by the marked increase in health insurance premiums, which have doubled on average over the past 20 years. The rising premium burden is increasingly less offset by premium reductions for lower and middle income households.

The variety of factors associated with regional differences within Switzerland can also be gleaned from studies by economists at Credit Suisse. Since 2006, they have regularly published an assessment of the financial attractiveness of housing in Switzerland's municipalities and cantons. They determine the freely disposable income of a middle-class household for each municipality and canton. Factors considered include the tax burden, health insurance premiums and premium reductions, location-based rent and real estate prices, family allowances, and commuting costs (Rühl et al. 2016). Unsurprisingly, the canton ranking reveals that rural cantons such as Uri and Glarus, characterized by low housing costs and minimal tax burdens, place the least strain on household budgets. In contrast, urban cantons like Geneva and Basel-Stadt are more expensive, primarily due to high housing costs. Schüpbach et al. (2021) further delineate differences by household type. Pronounced differences between cantons can be observed for families with children. These variations can be attributed to family allowances, contributions to childcare costs, and family-specific

tax regulations. In the family-specific intercantonal ranking, families live most favorably in the canton of Valais.

In a study on the cost of living in old age, Meuli and Knöpfel (2021) conclude that residence-specific factors are especially relevant for assessing inequality in old age. Among other considerations, they focus on financial inequalities related to care costs and find that disposable income depends not only on the initial financial situation of pensioners but also on location-specific fixed costs such as rents, health insurance premiums, and taxes. It is also influenced by regionally varying social transfers and care costs.

2.3 Research Gap and Contribution of the Present Study

Overall, previous research indicates that the cost of living is a relevant factor in inequality and that it can vary over time and across regions. Recently, inflation and rising energy prices have garnered increased attention, though studies based on current data are not yet widely available. Trends in the general housing market costs have also been explored. Overall, rising housing costs tend to exacerbate inequality because individuals with low incomes must allocate a larger share of their household budgets to housing. However, when regional living costs are considered in income inequality analyses, this typically results in a reduction in overall income inequality compared to an analysis that overlooks regional differences. This can be attributed to the fact that more expensive regions are often associated with both higher wages and higher living costs.

Furthermore, the discussed studies and reports for Switzerland are based either on a collection of aggregate data or on simulation calculations for sample households. Relevant cost factors can still be derived from these. At the same time – as a holistic perspective is missing – it is unclear to what extend living costs contribute to economic inequality and how relevant regional differences are. For a comprehensive classification, individual data on income distribution and information on cost of living is needed. Furthermore, data is needed that allows to capture relevant features of the regional heterogeneity within Switzerland. In a federal organized country like Switzerland, it is especially important to be able to address the situation at the cantonal level since key welfare instruments like direct taxes and health care premium reductions vary in design by canton, which plays a crucial part in the assessment of the post living cost income distribution.

To address these issues, we develop an analytical framework to be able to assess the importance of cost of living from an inequality perspective that takes regional differences into account by combing linked tax data with data on expenditures for daily needs as described in the following section.

3 Analytical Strategy, Data, and Methods

3.1 Distributional Analysis with Linked Tax Data

Tax data are a powerful source for mapping the financial situation of the population (Hümbelin and Farys 2016). Our data comprises six cantons out of the WiSiER data (Wanner 2019) that were further enriched as part of the SNSF-project "Inequality, poverty risks and the welfare state" (SNSF-project 178973) with data on direct taxes, health care premiums reduction payments, and other canton-specific benefits. This provides a reliable picture of the financial situation of all households, and it makes it possible to analyse the relevance of taxes and health care costs, as it is the aim of this study. Since the data is linked to several registers, it allows us to validly measure household incomes. Additionally, the data can be used to determine the municipality of residence of each household, enabling us to incorporate regional differences in the analysis. We use data for the cantons of Aargau (AG), Bern (BE), Geneva (GE), Lucerne (LU), St. Gallen (SG), and Valais (VS) for the year 2015 which is the latest year at hand. The data cover parts of both German- and French-speaking Switzerland. Our analyses are based on permanent residents in private households. We further restrict the data to the working-age population and their children and describe the financial situation for 3 079 340 individuals which represents 45% of the population below the age of 65 (as of 2015). We use the OECD equivalence scaling for household incomes (for more details regarding the data preparation see Hümbelin et al. 2023a).

To examine the relevance of living costs from an inequality perspective validly, it is necessary to comprehensively map all incomes. We include market income from (self)-employment and assets recorded in the tax data, all taxable social security benefits, private transfers, and non-taxable means-tested benefits (such as social assistance, supplementary benefits, or individual premium reductions). We employ different income concepts for our analyses. The relevance of living costs is quantified by comparing the distribution of income before and after deducting living costs (disposable incomes). For some analyses, the population is divided by income class to highlight income-dependent effects. This classification uses income before means-tested benefits are added.

3.2 Analytical Strategy

To map cost items, we use official sources or rely directly on our data, aiming to cover the cost of living as comprehensively as possible. However, conceptually, it is not entirely clear how to account for cost of living in all cases. We thus implement two approaches to assess cost of living for daily needs and housing costs:

- *Minimum cost of living:* Following this approach, we determine how much households require to cover the minimum cost of living. This essentially adheres to the guidelines of the Swiss Conference for Social Welfare (SKOS). These guidelines assess entitlement to social assistance and are often used for the definition of the poverty line for statistical purposes.
- *Average cost of living:* Another scenario captures the impact of the average cost of living on income distribution. For this, we draw from the average costs recorded in the national Household Budget Survey HBS, which offers detailed insights into expenses in Switzerland.

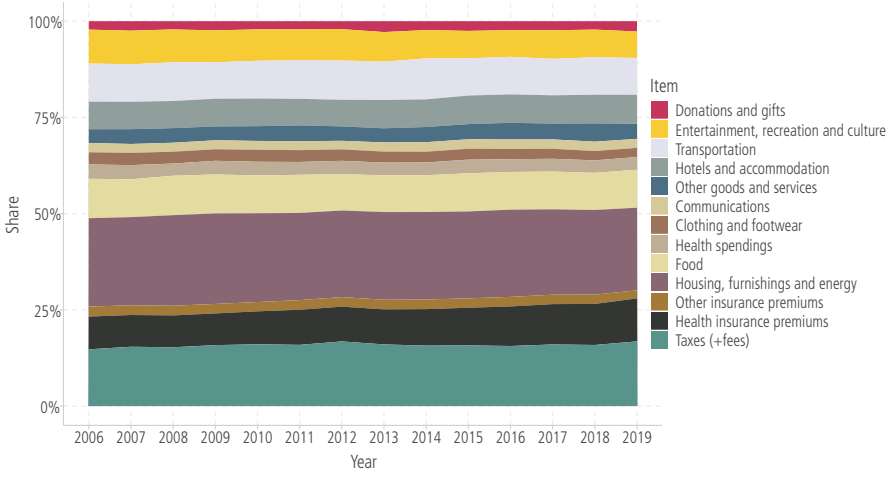
Once the cost of living is established, its effect on income distribution can be determined empirically using the following analytical techniques:

- *Aggregated effects:* We employ a method suggested by Reynolds and Smolensky (1977), commonly utilized in distributional studies (Caminada et al. 2019a; Causa and Hermansen 2020; Hümbelin et al. 2021b). This method relies on Gini coefficients as a measure of inequality. By contrasting the Gini coefficient of incomes before and after factoring in the cost of living, we can quantify the shift in inequality due to living costs. To gauge the significance of each cost component, differences are calculated by sequentially adding the items. Since the sequence of the inclusion influences the size of the effect, we evaluate all effects uniformly, comparing the income distribution after all transfer payments (prior to accounting for living costs) with an income distribution where each cost item is individually considered. This leads to a slight overestimation of the importance of the single components. To ensure individual effects aggregate to the case where all cost items are included simultaneously, all effect estimations are scaled proportionally.
- *Income-related effects:* The analysis is complemented by a calculation of the average burden of each cost item on household budgets along income deciles. This provides information on the extent to which households are burdened by the expenditures depending on their income position. Households are divided into income deciles based on income before means-tested benefits, as this income best reflects economic performance of a household. However, the burden on household budgets is calculated based on income after transfer payments, as this is the income available to households to cover the cost of living.
- *Regional differences:* In a final analytical step, we investigate the importance of regional differences. In federal Switzerland, these come especially to bear at the level of the cantons and the municipalities. They are particularly reflected in the different design of instruments such as cantonal and municipal taxes, but also in different costs of health insurance premiums and the models of individual premium reductions.

Cost of Living in Switzerland

The statistics from the Household Budget Survey can be consulted to illustrate expenditures in Switzerland. Figure 1 shows the cost items as they are listed in these statistics and how their composition has changed from 2006 to 2019.

Figure 1 Composition of Household Spending in Switzerland



Source: HBS statistics 2006–2019. We integrated 'Alcoholic beverages' into 'food', 'home furnishings' into 'housing', and 'energy, supplementary health insurance and mandatory premiums' into 'health insurance premiums', as well as 'fees' into 'taxes' to get a more compact view. Social security contributions are excluded.

Housing and energy costs are the largest expenditure items in the household budget, accounting for about a quarter of total expenditures. Overall, the share of housing and energy costs has remained constant since 2006. However, when housing and energy costs are broken down into costs for renters and costs for homeowners, it becomes apparent that costs for homeowners have fallen significantly due to low mortgage rates, while rents have risen (Schärrer et al. 2022).

Taxes represent the second-highest expenditure share. On average, expenditures for taxes and fees burden household budgets between 13–15% of total expenditures. However, the tax burden varies greatly by income class (as well as by canton and municipality) since it is highly progressive. In recent decades, tax rates have been adjusted. For instance, since the 1980s, taxes have been reduced much less for middle-income earners than for top-income earners, both at the federal and especially at the cantonal level. In some cantons, taxes on middle incomes even increased slightly from 2000 onward (including Aargau and St. Gallen). Tax reforms or reductions since the 1980s have predominantly benefited the upper income brackets, and their

incomes have also risen disproportionately. This has resulted in a weakening of the income tax progression (Lampart and Schüpbach 2020, 13–14).

Expenditure on health insurance premiums for basic insurance also accounts for a notably large share. The data indicates that the share of total expenditure has continuously increased since 2006. While the share of spending on premiums was 6% of total spending in 2006, it steadily rose to 8% in 2019. This trend is expected. Since the Health Insurance Act (KVG) was enacted in 1996, health insurance premiums have increased in tandem with the consistent growth in healthcare costs over the long term. The growth in premiums between 1996 and 2015 is substantial: While in 1996, the average monthly premium per capita in Switzerland was CHF 128, in 2015 the average monthly premium was CHF 274, representing a doubling in 20 years (BAG 2022).

Another group comprises numerous smaller expenditures. These consist of the most important consumer goods that form the so-called basket of goods (BFS LIK 2022). This includes everyday items such as food, clothing, expenditures for health, accommodation, transport, and culture.

According to the Household Budget Survey, in 2019 an average Swiss household was left with an income of CHF 1 232 per month at free disposal after covering all expenses described above. This "free" income is often described as savings amount (BFS 2022b).

For further analyses, we categorize the cost of living into four groups: 1) expenses for everyday necessities, 2) mandatory health insurance premiums, 3) housing costs, and 4) direct taxes. These encompass the primary cost items associated with the cost of living in Switzerland. Below, we explain how we determine their values for the analysis. Detailed information can be found in Hümbelin et al. (2023a).

Costs for Everyday Necessities

In the *"minimum" scenario*, we rely on the basic needs as defined by SKOS Guidelines. Accordingly, CHF 986 per month is available for a one-person household. The additional amount per person decreases for each additional person in the household, based on the SKOS equivalence scale. For instance, the basic need for two people is CHF 1 509. Such needs in social assistance are intended to cover all living expenses, but costs for housing and health under compulsory health insurance are covered separately (see below). Stutz et al. (2018) recently evaluated the level of basic needs in social assistance. They suggest that food expenses and actual transport costs are underestimated. They also note that the SKOS social assistance budget, grounded in general expenses, overlooks bottleneck situations like premiums for insurance policies that cannot be terminated immediately, rental costs that surpass guidelines, or taxes that are due. Stutz et al. (2018) state that there is little potential for savings in basic needs, which are largely fixed in nature, without accepting severe limitations, such as health risks.

For the *"average" scenario*, we use the empirical consumption expenditures of single-person households under the age of 65, excluding expenditures for housing costs and health insurance premiums. As per HBS statistics, the average expenditure for this type of household is CHF 2 057 (based on the 2015–2017 pooled evaluation from HBS). Using this as a reference, amounts for larger households are adjusted using the SKOS equivalence scale to ensure comparability with the minimum scenario. For instance, the amount for a two-person household is CHF 2 689.

According to the HBS, there are some variations between cantons regarding the cost of everyday goods (BFS 2021). Hence, we make minor regional adjustments in both scenarios for the cost of everyday goods, ranging from a factor of 0.95 (Bern and St. Gallen) to 1.01 (Aargau). In general, regional differences in the cost of living related to day-to-day goods in Switzerland are quite small. This observation aligns with the assessment of the Prices Section of the Federal Statistical Office, which maintains that regional price differences in Switzerland are negligible.

Housing Costs

The structural survey is large-scale survey that is part of the population census and the sole source with information on net rents paid in Switzerland (BFS 2024). It reveals regional differences in the housing market. Notably high rents are found in Geneva, while the cantons of Aargau and Lucerne closely align with the Swiss average. Since 2010, residents of the cantons of Bern, St. Gallen, and Valais have been paying rents below the average (BFS 2022a). The significant regional differences in rents can largely be attributed to economic activity. Rents are especially high in economically robust urban centers and their surrounding areas. This is evident in regions like greater Zurich, Geneva, the canton of Vaud, and the Basel area. In contrast, areas like the canton of Jura and the Neuchâtel regions of the southern Jura foothills, due to their weaker economic activity, typically exhibit below-average rent levels.

For our purposes, we utilized rental cost estimates from the structural survey, available in the linked tax data. We harnessed the information from approximately 191 000 observations (2011–2015 pooled dataset) to develop a statistical model that estimates typical rents for each municipality. The model leverages household size and the average income of each municipality to predict rents as recorded in the structural survey. Using the model's parameters, we then impute the local expected rent value for all households in the dataset. This allows us to gauge the typical housing costs for households, taking into account their place of residence and household size.[2] For the *"average" scenario*, we apply the mean estimated rent. For the *"minimum" scenario*, we use the 20th percentile, aligning with the premise that social assistance

2 The procedure introduces some endogeneity into the analysis, as housing costs are estimated based on income, which is then part of the analysis. An approach to remove the endogeneity would be to estimate the expected rent for a given household by omitting the data of that specific household from the computations (leave-one-out procedure). However, because incomes are aggregated by municipality, the endogeneity problem is negligible.

agencies set ceilings on the housing costs they cover. To determine the total rent cost, we add 20% to the net rent for additional expenses. By establishing this procedure, we address two issues. Firstly, we disentangle voluntary from involuntary costs, as housing costs are assessed against the local housing market and regardless of the effective costs that might be driven by individual preferences and random components of finding an affordable apartment. Secondly, we establish a common measure for both renters and homeowners.

Cost of Health Insurance Premiums

We use statistics from the Federal Office of Public Health (FOPH) to obtain the age-specific average premium burden for each municipality. In addition to individual factors such as age and the chosen deductible rate, the premium amount also depends on the place of residence. Insurers determine premiums for the upcoming year based on anticipated costs. In this context, insurers can set up to three different premium levels within a canton according to premium regions defined by the Federal Department of Home Affairs (FDHA). Among the six cantons studied, the cantons of Bern (average CHF 374 per month) and Geneva (CHF 420 per month) have notably high expenditures for health insurance premiums. Costs are significantly lower in the cantons of Valais (CHF 301), Lucerne (CHF 313), Aargau (CHF 320), and St. Gallen (CHF 328). Broadly speaking, health insurance premiums are generally higher in Ticino and French-speaking Switzerland, especially when compared to central Switzerland, where the premium burden is comparatively low.

In the *"average" scenario*, we use the average cost as reported in the FOPH statistics. For the "minimum" scenario, we use the same values but apply a 10% discount per person, reflecting the expectation of social agencies for beneficiaries to choose lower-cost health insurances.

At the same time, the Swiss system offers targeted relief to insured individuals through *Individual Premium Reduction contributions* (IPR), which are implemented by the cantons. The cantons set specific eligibility requirements, decide on the reduction amounts, and establish the processes and payment modalities. We account for these canton-specific premium reductions by using the actual payout data from the cantonal authorities. While the number of eligible recipients has declined over the past 20 years, the support provided has risen. There are considerable cantonal differences: Berne offers benefits to a relatively large number of people, but at a lower level, while Geneva provides significantly higher payments. These discrepancies arise from varying subsidy system designs across cantons. Procedures for assessing entitlement also differ; some cantons automate the process using tax data, whereas others require annual applications. Access to IPR is inconsistent across cantons because of different information strategies and application procedures. Studies have shown that a considerable number of eligible individuals do not receive means-tested benefits like IPR. For instance, in Basel-Stadt, it is estimated that 19% of those eligible do not receive IPR (Hümbelin et al. 2021a).

Direct Taxes on Income and Wealth

Switzerland's federal structure is reflected in the distinct sovereign tax systems of its cantons. Additionally, municipalities can levy taxes within the bounds of cantonal authorizations. As a result, direct taxes in Switzerland are imposed by the federal government, cantons, and municipalities. The direct federal tax covers only income, whereas cantonal and municipal taxes encompass assets as well.

Cantonal tax rates differ significantly. Permissible tax deductions, such as those for children or single-parent families, also vary widely between cantons, potentially leading to uneven tax burdens across cantons. Another distinction is in the tax progression structure. Except for the cantons of Uri and Obwalden, all cantonal income tax rates are progressive, though the degree of progression varies among them (SSK CSI and ESTV 2021). The tax system profoundly influences income distribution (Hümbelin et al. 2021b; Hümbelin et al. 2021c; Hümbelin and Farys 2018).

To gauge the impact of direct taxes on income and wealth, we can – in both scenarios – refer directly to the actual tax amounts paid. A comparison of the available cantonal data reveals that, on average, residents in the cantons of Geneva (~24 500 CHF) and Bern (~14 400 CHF) pay more in taxes, whereas in the canton of Valais (~11 800 CHF) and Aargau (~11 400 CHF) lower average taxes are levied (see Hümbelin et al. 2023a).

4 Importance of the Cost of Living for Inequality of Disposable Incomes

To illustrate the significance of the cost of living on the income distribution, we present the income-related cost-of-living burden as a percentage of income after transfers, grouped by income deciles. These deciles divide households into ten equally sized groups based on their equivalized household income. The lowest-income group (1st decile) has an average income of CHF 21 350, while the middle group (5th decile) averages CHF 39 000. The highest-income group (10th decile) boasts an average income of CHF 132 150. In Figure 2 and Figure 4 the burden related to cost of living is displayed on the y-axis while the separation by income classes is shown on the x-axis. Therefore, it gets visible how much of their income the respective income classes must use to cover cost of living.

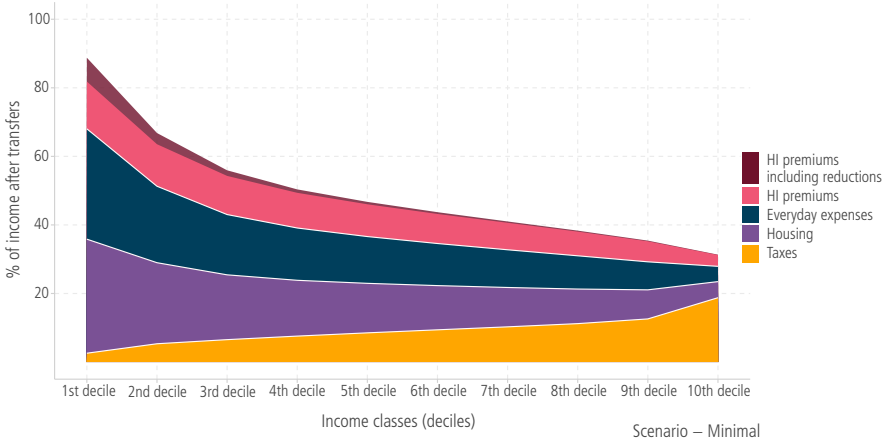
To highlight the influence of costs on income inequality, the Gini coefficient is calculated both before and after accounting for the cost of living (see Figure 3 and Figure 5).

4.1 Scenario – Minimum Expenses

In the *"minimum" scenario*, the impact of living costs is shown when a minimum standard of living is assumed. These minimum expenses are based on the absolute necessities in accordance with the social subsistence minimum as described in the

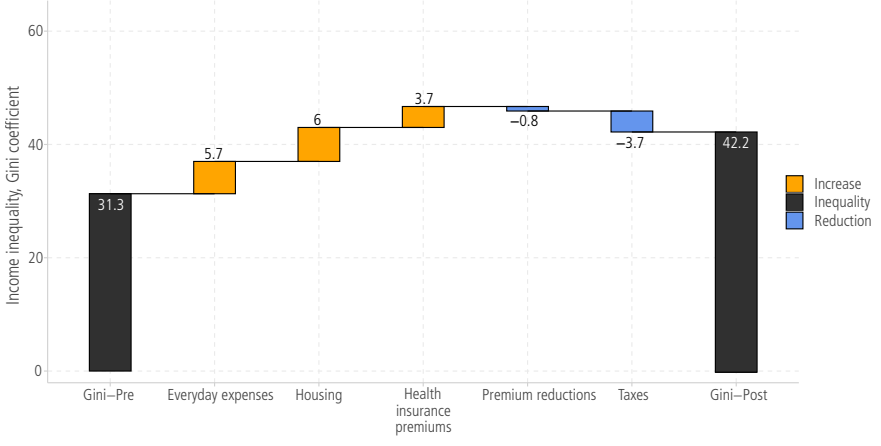
guidelines of the Swiss Conference for Social Assistance. This is true for everyday expenses, health insurances premiums (including reductions), and housing costs. Taxes are included as they are levied.

Figure 2 Burden of Minimal Living Costs on Household Incomes



Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.
Note: HI (health insurance).

Figure 3 Effects of Minimal Cost of Living on Inequality of Disposable Incomes



Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.

Figure 2 illustrates that the lowest-income 10% of the population are significantly burdened by essential outlays for daily necessities and housing costs. Roughly a third of their income is allocated to goods for daily needs, while another third covers minimal housing expenses. Although low-income groups are exempt from federal taxes, cantonal and municipal taxes sometimes do not have exemptions below the poverty line. As a result, even those with very low incomes incur tax obligations. In our analysis, the lowest-income group uses 3% of their income for taxes.

Health insurance premiums constitute approximately 21%, but mitigation by premium reductions results in a remaining burden of 14%. It is evident that this relief diminishes as income increases, though it extends into middle-income brackets. In total, the lowest income group utilizes about 82% of their post-transfer income for essential expenses. This is in line with the expectation since the minimum expenses are pegged to the subsistence minimum as defined by SKOS, which also informs the determination of social assistance payment amounts. Across the nation, roughly 3% of the population benefit from social assistance. The financial burden of minimum living expenses recedes as income grows. The top 10 percent income earners allocate about 31% of their income to these costs. Of this, taxes constitute the most substantial portion at 19% while regular expenses for daily necessities (4.5%), health insurance premiums (3%), and housing (4.5%) – aligned with minimal living standards – account for only 12% of post-transfer income.

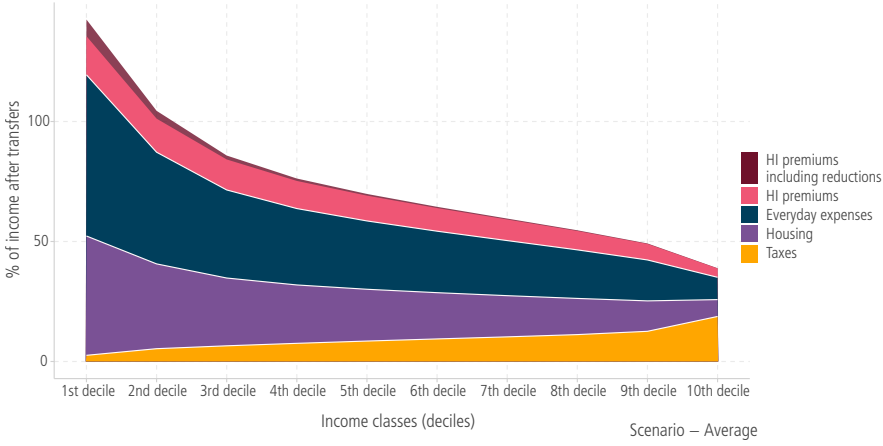
Incorporating living expenses results in a marked surge in the inequality of disposable incomes, as illustrated in Figure 3. The Gini coefficient jumps from 31.3 before factoring in these expenses to 42.2 after considering daily expenses, housing costs, and health insurance premiums. This corresponds to an increase in inequality of 34%.

4.2 Scenario – Average Expenses

The *"average" scenario* shows the effects on inequality of disposable incomes associated with an average standard of living. Cost respectively increases for everyday expenses, health insurance premiums, and housing (but not for taxes). In addition, the analysis shows to what extent average expenses can be borne depending on income class.

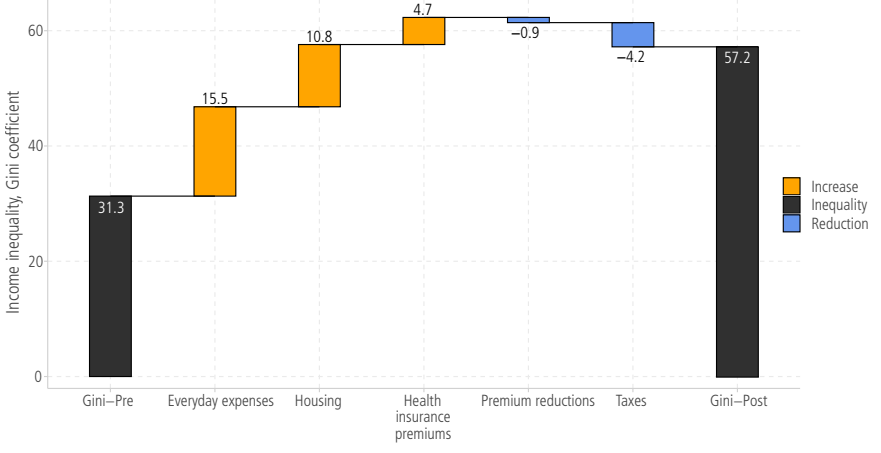
As depicted in Figure 4, assuming an average cost of living results in a generally higher burden for all income classes, with the burden decreasing as income increases. Up to the 90th percentile, all income classes allocate 50% or more of their income to cover basic needs. For the poorest 20% of income groups, the cost of living would surpass their income. For the lowest-income 10%, expenses exceed their income by 135%. Only the highest-income 10% group experiences a significantly reduced impact from the cost of living.

Figure 4 Burden of Average Living Costs on Household Incomes



Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.
Note: HI (health insurance).

Figure 5 Effects of Average Cost of Living on Inequality of Disposable Incomes



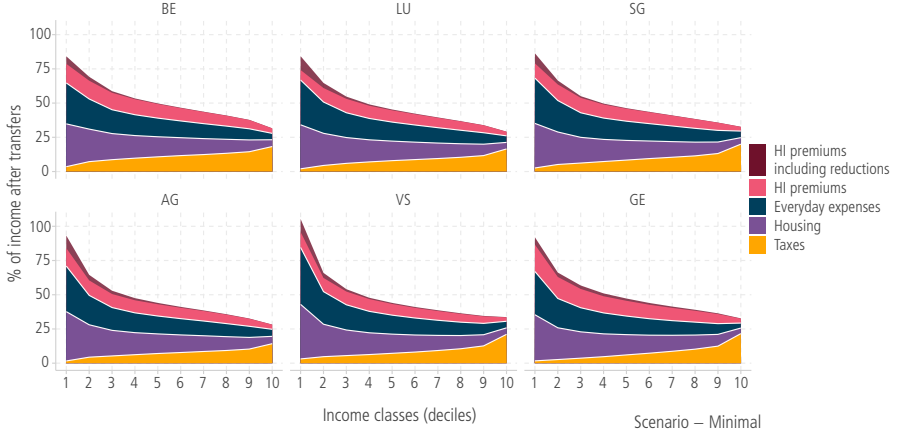
Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.

In the average scenario, the Gini coefficients stand at 31.3 before costs and rise to 57.2 after costs (as shown in Figure 5), a difference of 25.9 Gini points (GP). This disparity is roughly double compared to the minimal scenario (+10.9 GP). As illustrated in Figure 5, everyday expenses contribute the most to the cost burden (+15.5 GP), followed by housing costs which add another 10.8 GP, and health insurance premiums adding 4.7 GP. The impact of the latter is slightly mitigated by premium reductions (–0.9 GP). Direct taxes play the most significant role in reducing the Gini coefficient (–4.2 GP).

4.3 Regional Differences

A final analytical step examines differences within Switzerland adopting the minimal cost of living approach. Figure 6 reveals similar overall patterns, but some cantonal differences become evident. People in the cantons of Valais and Geneva experience a somewhat more unequal burden. For the lowest-income group, the cost of living, especially housing costs, is challenging to manage. Variations in the effectiveness of welfare state measures are also apparent. In the canton of Lucerne, the lowest-income group benefits from highly targeted relief via premium reductions. The slightly elevated overall tax burden in the canton of Bern is notable. Meanwhile, in the canton of Geneva, the tax progression places a relatively heavier burden on the highest-income groups.

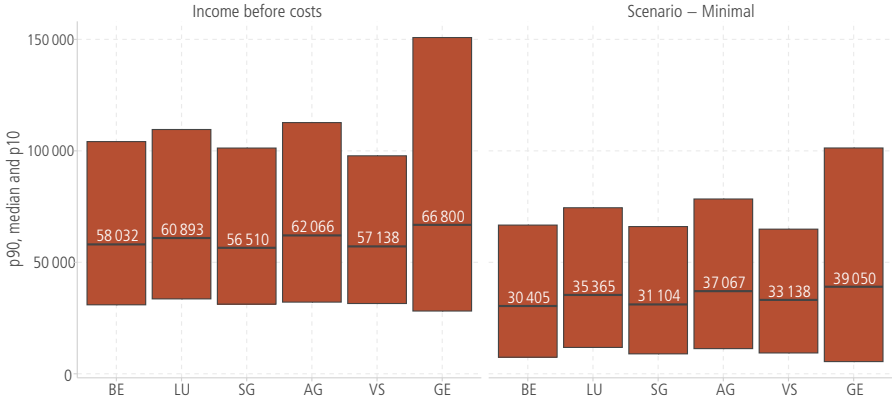
Figure 6 Cost-of-Living Burden on Household Incomes by Cantons



Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.
Note: HI (health insurance).

The extent to which the respective income groups are burdened by living costs is on the one hand a consequence of the different costs incurred, but also of the existing incomes. Figure 7, therefore, shows the median income per canton before and after deduction of the cost of living. In addition, the limits of the 10% with the highest income (p90) and the 10% with the lowest income (p10) are shown, so that an impression of the income distribution per canton can be gained.

Figure 7 The Effect of Costs of Living on Disposable Incomes by Canton



Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, own calculations.
Note: Shown are median equivalized household income (p50) and 10th and 90th percentiles (p10 and p90).

In the canton of Geneva, incomes before the cost of living are the highest compared to other cantons, at CHF 66 800. The lowest incomes are in St. Gallen, at CHF 56 510. However, incomes in Geneva are also the most unevenly distributed. This is in part due to the fact that Geneva is an urban canton, and urban regions tend to have significantly more uneven income distributions. When accounting for living costs, the remaining incomes are generally lower. The shifts between the cantons, considering regionally varying living costs, are notable. Incomes decline more sharply in the cantons of Bern and Geneva, which face comparatively higher taxes and, particularly in Geneva, elevated housing costs. In relative terms, incomes decrease less in the cantons of Lucerne, St. Gallen, Aargau, and Valais.

After factoring in the minimal cost of living, median disposable incomes remain highest in Geneva. However, the poorest (p10) segment also has the lowest income there. Due to higher average costs, the median income in the canton of Bern becomes the lowest after accounting for living expenses. Overall, inequality between cantons slightly intensifies after considering the cost of living, by 1.9 Gini Points.

Table 1 Inequality Within Cantons Before and After Cost of Living

	Gini-Pre	Everday expenses	Housing	Health insurance	Premium reductions	Taxes	Gini-Post
BE	29.2	+6.0	+6.5	+4.1	−0.7	−3.1	42.0
LU	29.2	+5.4	+5.5	+3.1	−0.8	−3.3	39.1
SG	28.7	+6.1	+6.2	+3.5	−0.7	−4.1	39.8
AG	28.9	+4.5	+5.1	+3.1	−0.8	−2.5	38.3
VS	27.6	+5.9	+5.8	+3.0	−0.8	−3.9	37.6
GE	41.7	+5.7	+6.1	+4.8	−0.9	−6.1	51.3

Data: WiSiER-Data 2015 (AG, BE, LU, SG, VS, GE) linked with additional information, absolute change in Gini coefficient, own calculations.

As shown in Table 1, we measure higher Gini coefficients when costs are considered. The difference is most pronounced in Bern – especially with respect to housing costs – while it is lower in other cantons. Welfare instruments do reduce inequality to a smaller degree. The most variability between cantons is found for taxes, followed by health care premium support.

5 Conclusion

In this study, we assessed the importance of the cost of living to the inequality of disposable incomes. This is especially crucial in a wealthy but expensive country like Switzerland. It ranks as the most expensive country in Europe, with an average household expenditure that is 70% higher than the EU average (Eurostat 2022). This context also puts its generally high wages into perspective. Moreover, significant differences arise in housing costs based on the place of residence. For instance, cities such as Geneva and Zurich have consistently ranked among the world's most expensive cities, while living in peripheral areas is considerably cheaper. Additionally, due to Switzerland's federal structure, there are cantonal disparities. The assessment of direct taxes on income and assets, as well as the distribution of premium reductions – a welfare instrument designed specifically to reduce the burden of healthcare premiums – can vary widely within Switzerland.

Our analyses reveal that the cost of living substantially exacerbates inequality, whether one assumes a minimum necessary cost of living (+10.9 GP) or an average one (+25.9 GP). The main reason for this effect is the high costs for basic goods in Switzerland, which means that low incomes are disproportionately burdened compared to middle incomes and the affluent. Based on our calculations,

the lowest-income 10% of the population must allocate 82% of their income to minimum cost of living. If we consider an average cost of living for everyday expenses, housing, and healthcare premiums, 20% of the population would not be able to afford it. The average cost of living poses a relative burden of 70% to 50% for middle-income groups. In contrast, the incomes of the highest-earning group are impacted to a much lesser degree. While this segment pays a significant amount in taxes, expenditures on health insurance premiums, housing, and everyday items pose minimal concern for the wealthiest, which leaves up a large proportion of their income at free disposal that might be spent on luxury goods or used to accumulate wealth (which might also be a component that contributes to rising wealth inequality in Switzerland; see the world inequality database cited in Hümbelin et al. 2023b).

The most significant changes in the two scenarios studied relate to everyday expenses for food, clothing, mobility, and the like. While the assessment basis for social assistance provides only a lump sum of 986 CHF per month (for one person), Swiss citizens spend an average of 2 057 CHF per month. This indicates that the impoverished must manage with considerably less than the general population. It also emphasizes that the determination of the limit of absolute needs for daily living expenses is not trivial but can be derived solely more or less justifiable by theoretical or empirical means.

Regardless of our assumptions, the significance of housing costs is notable (+6 to 10.8 Gini points). Given the rising rents in recent decades, it becomes evident that compensation mechanisms for low-income earners should be increasingly implemented in this domain. An income-dependent evaluation of rental costs from the structural survey reveals that rents in the average to low-price segment show limited elasticity (seeTable 11 in Hümbelin et al. 2023a). From middle income classes downward, housing costs are comparable or only marginally lower. Additionally, the impact of housing might be even more pronounced since, for our simulation, we assume uniform residential situations across all income classes. The dynamics might differ if homeownership were considered. Nevertheless, a tax-data-based analysis on homeownership by income class reveals that merely 5% of the lowest-income group reside in self-owned housing (see Figure 14 in Hümbelin et al. 2023a). For the highest-income group, this percentage rises to 34%.

Inequality is marginally offset by premium reductions (−0.8 to −0.9 GP). As designed, these reductions alleviate the strain on the lowest-income groups. Yet, the inequality-augmenting aspect of health insurance premiums prevails (+3.7 to 4.7 GP) since, by design, mid to high income groups incur the same charges. The equalizing influence of progressive taxes is more pronounced (−3.7 to −4.2 GP) as the progression is more steeply structured. As those with higher incomes contribute more, the tax imposition fosters immediate economic equalization. Furthermore, taxes underpin public goods that benefit every societal layer. However, even though taxes do result in diminished income inequality, in comparison to the effects of other

living costs components, this impact remains relatively modest. It is worth mentioning that Switzerland's tax ratio stands below average at 21.4%, whereas the unweighted OECD average is 25.3%. Countries like Denmark (44.4%) and Sweden (34.3%) manifest particularly elevated tax rates. In comparative studies, Switzerland emerges as a nation with a relatively subdued inequality-mitigating influence through taxes. For instance, Caminada et al. (2019b, 130) observe: "In this country, it appears to be difficult levying redistributive taxes from the affluent and mobile persons. As a result, the amount of taxes paid by rich people is relatively low."

Our analyses further indicate that there are considerable differences among the cantons we studied, both in terms of income distribution and the cost of living. In the urban border canton of Geneva, the median equivalized household income stands highest at CHF 66 800. In the other cantons studied, the median income fluctuates between CHF 56 510 (St. Gallen) and CHF 62 066 (Aargau). In Geneva, however, the variations in income are notably larger, an observation partially attributable to the canton's urban nature. The cost of living is also markedly elevated, encompassing taxes, housing costs, and health insurance premiums. Taxes and health insurance premiums similarly peak in Bern. Nonetheless, based on the household budget survey, regional disparities in spending on everyday necessities remain minimal. When regional differences in the cost of living (covering everyday expenses, housing, health insurance premiums after accounting for reductions, and taxes) are incorporated, this initially translates into an escalation in income inequality between cantons (+1.9 GP) which is mainly caused by the different tax systems. While the analysis shows that regional differences in cost of living are partly influenced by the design of welfare instruments that differ by cantons, the variation within these cantons remains hidden. Further research could dwell in this direction by studying for example urban/rural differences and other regional mechanics that might affect regional differences within Switzerland.

We conclude with a reflection in which we highlight the limitations of our approach and emphasize the resulting need for further research. Conceptually, pinpointing how living costs should be integrated into an inequality evaluation poses challenges. One strategy entails leveraging detailed, regionally expansive consumption expenditures that can be aligned at the household tier, thereby facilitating an analysis centered on actual expenditures. However, such data sets are scarce internationally. Moreover, the efficacy of this method remains debatable since household expenditure on specific goods might oscillate based on individual preferences. In the realm of a distributional examination, it appears more pertinent to concentrate on indispensable expenses. The emphasis, therefore, shifts towards delineating the essentials for an adequate lifestyle. Defining "adequate," though, remains elusive. Hence, we opted for quantifying living expenses across two scenarios. Conceptually precise is the approach that utilizes the absolute minimum expenses, where the social subsistence threshold, as per the SKOS guidelines, provides a benchmark. To offer

a holistic perspective, the average scenarios illustrate the variance when operating with expenses exceeding the bare essentials but are still common.

In summation, our findings confirm that inequality metrics consistently amplify when one assesses an income distribution with subtracted costs for living, irrespective of the chosen scenario. The empirical evidence suggests that inequality studies should accord greater emphasis to the dimension of living costs.

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