Unpacking Inequality in Austria:
Understanding Inequalities through the Interplay of Income, Consumption, and Social Infrastructure

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Already in the 1980s, the analysis of inequality has evolved beyond a focus on income, acknowledging the importance of multidimensional measures that encompass factors like human and social capital, health and material living conditions (Nussbaum & Sen, 1993). This shift emphasizes that well-being is not solely contingent on financial resources but also on various aspects of individuals' living standards. Many scholars have addressed this and explored inequalities beyond income. However, a significant number have done so relying solely on descriptive analyses or neglecting spatial and geographic dimensions (see, e.g., Chakravarty & Lugo, 2016; Khorrami et al., 2021a for an overview). This paper addresses this issue by delving into the discourse on liveability and multidimensional inequality, employing a model-based approach with data at the sub-national level. Specifically, the study utilizes the residual income approach (Calafati et al., 2021) to examine societal stratification at the sub-national level in Austria through latent class modeling.

The concept of livability is one approach gaining prominence in the literature on well-being mostly discussed within an urban context. Livability refers to the tangible and intangible aspects of individuals' environments, encompassing opportunities within a specific spatial context, including education, health, public transport, and leisure (Higgs et al., 2019; Sheikh & van Ameijde, 2022). Central to the discourse on livability is public social infrastructure, with proximity to such facilities being posited as a key factor in enhancing the quality of life in cities. However, the issue of livability extends beyond urban boundaries, becoming a pronounced regional concern due to, for example, unequal distribution of social infrastructure across spaces (Meloni et al., 2023; Perpiña Castillo et al., 2022). Although the liveability literature has laid its focus on infrastructure provision, governance structures, safety and security (Khorrami et al., 2021), disposable income and consumption of households are argued to be crucial aspects of livability (Wolbring et al., 2013).

The financial resources available to households for spending on essential goods and services play a pivotal role in determining living standards. Thus, expenditure for essential goods and services and social infrastructure provision are naturally intertwined, as privatization of public services may reduce disposable income, particularly impacting low-income households that heavily rely on public infrastructure.

Therefore, to examine liveability thoroughly, a comprehensive approach that goes beyond income is essential. While various studies have employed alternative metrics, notably Sen's capability approach (1985), the Human Development Index (2022), the Multidimensional Poverty Index (2023), and the Global Liveability Index (2023), many indicators either lack spatial aspects or sufficient disaggregation, or exclusively concentrate on urban contexts. Building on Calafati et al. (2021) and Bassens et al. (2023), who utilize the residual income approach to highlight regional variations in the costs households bear for essentials like housing and utilities, we extend their methodology. Our analysis involves calculating the residual income for Austrian households at a sub-national level and subsequently integrating the accessibility of social infrastructure. By doing so, we also aim to enhance the discussion around livability, which so far was narrowly discussed in urban contexts, to investigate territorial disparities in a country.

Austria serves as a compelling case study for this endeavor. Despite its reputation for a redistributive welfare state (OECD, 2019), regional disparities in investments in social infrastructure persist, contributing to within-country inequalities (Neuhuber & Schneider, forthcoming). The country faces challenges, such as a rise in the share of people at risk of poverty or exclusion, challenging the assumption that monetary redistribution alone is sufficient for safeguarding against poverty. Furthermore, although national income inequality in Austria is low, stark regional and wealth inequalities persist (Pfeffer & Waitkus, 2021). Furthermore, Vienna, known for its high scores in global liveability rankings (The Economist Intelligence Unit, 2023), stands in stark contrast to Austria's rural areas with lower social infrastructure density. This disparity underscores the multifaceted nature of livability and the challenges faced by regions with varying access to social infrastructure.

In short, this paper contributes to the existing literature in several ways. Firstly, we utilize the residual income approach by Calafati et al. (2021) and Bassens et al. (2023) to investigate disparities in disposable household income minus costs for essentials within Austria and extend their approach by acknowledging the intertwined nature between well-being and social infrastructure provision. Secondly, we use these findings to examine the societal stratification along the lines of residual income and social infrastructure accessibility using latent class analysis. Many studies exploring inequality beyond income often employ composite indicators and factor analysis. While this method typically provides easily interpretable outcomes, such as one or a few numerical indices, comprehending them in detail can be challenging, especially when a lot of variables are aggregated into a single indicator. In contrast, Latent Class Analysis (LCA) represents a model-based approach that offers greater flexibility. Thirdly, we determine which socio-economic variables (e.g., household composition, education, tenure type) affects this clustering process, offering more robust insights into the drivers of societal stratification.

To assess residual income and accessibility to social infrastructure in Austria, multiple datasets are required. First, household income is calculated, utilizing the Integrated Wage and Income Tax Survey spanning from 2019 to 2020 acquired from Statistics Austria. This comprehensive database encompasses earnings from both self-employed and employed work, along with various transfers such as pensions, childcare allowances, unemployment benefits, and minimum income. The household-adjusted disposable income for all households is calculated using the OECD-modified scale (OECD, n. d.). For household expenditure calculations, we rely on the Household Budget Survey 2019/20 provided by Statistics Austria. This dataset captures the detailed expenditures of 7,319 households over a two-week period. Additionally, the survey includes supplementary information about individuals residing in the household, including details such as education, age, employment status, and more. Moreover, we compile our own database, incorporating diverse dimensions of social infrastructure for all municipalities in Austria. This encompasses data on kindergartens, childcare facilities, schools, hospitals, doctors, elderly care facilities, and other social service institutions.

The integration of these distinct datasets results in a comprehensive database that encompasses household disposable income, consumption of goods and services, and the accessibility of social infrastructure in the municipalities where households reside.

The analysis is divided into three steps. Firstly, we compute the residual income of households, obtained by subtracting expenditures on food, housing, utilities, and transport from disposable income. Subsequently, we assess the degree of social stratification along the three dimensions (income, consumption, and availability of social infrastructure) using Latent Class Analysis. Employing clustering techniques, such as LCA, are valuable for examining sub-groups within a population. Typically, these methods partition the data into distinct clusters to determine the degree of grouping within the sample, thus allowing for the identification of heterogeneity in the population. LCA proves valuable in this exercise for various reasons. Firstly, the method is probability-based, indicating the absence of an assumption regarding absolute certainty in group membership. This attribute carries several advantages. Accordingly, class membership remains flexible, as households are assigned to a group based on probability. Consequently, as the probability of households belonging to a specific cluster increases, the level of uncertainty decreases. This suggests that in cases involving clusters at the extremes (e.g., very low residual income+ and very high residual income+), the population demonstrates a significant stratification, and households have a high probability of belonging to a particular group, with a low probability of belonging to an alternative group. Secondly, LCA is able to handle mixed data types (i.e., categorical and continuous data) and missing data, making it more flexible than other clustering techniques (Hunt & Jorgensen, 2003). Third, LCA facilitates the estimation of diverse goodness-of-fit metrics, that provide insights into how well the proposed model represents the observed data. More specifically, compared to alternative clustering techniques, LCA enables the testing of the optimal number of clusters by comparing a range of fit measures across different models.

Preliminary results suggest that residual income varies significantly among households, with some surpassing the mean residual income by fivefold. Conversely, certain households experience negative residual income, indicating a reliance on borrowing or savings to meet essential expenses. Robust clustering is established by considering residual income alongside tenure type, mobility patterns, and household composition. Subsequent analyses will investigate the social infrastructure dimension to explore the connection between residual income and accessibility to social infrastructure.

The findings of this study hold significance both in academic and policy contexts. Firstly, by expanding the residual income approach and conducting analyses at the subnational level, we present additional avenues for exploring multidimensional inequality, liveability, and well-being. Additionally, our methodological approach goes beyond descriptive statistics, incorporating cluster analyses followed by regression analyses to enhance the analytical aspects regarding this subject. In terms of policy relevance, this paper aims to inform policymakers about societal stratification beyond income. Recognizing the interconnected nature of income, consumption, and social infrastructure accessibility is crucial for creating well-designed policies.

References

Bassens, D., Froud, J., Haslam, C., Johal, S., & Williams, K. (2023). *Market entitlement and the foundational economy/FE 4 metric after the "cost of living crisis". Foundational Economy Collective Working*(Paper 11).

Calafati, L., Froud, J., Haslam, C., Johal, S., & Williams, K. (2021). Diversity in leading and laggard regions: Living standards, residual income and regional policy. *Cambridge Journal of Regions, Economy and Society*, *14*(1), 117–139. https://doi.org/10.1093/cjres/rsaa027

Chakravarty, S., & Lugo, M. A. (2016). *Multidimensional Indicators of Inequality and Poverty* (M. D. Adler & M. Fleurbaey, Hrsg.; Bd. 1). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199325818.013.7

Higgs, C., Badland, H., Simons, K., Knibbs, L. D., & Giles-Corti, B. (2019). The Urban Liveability Index: Developing a policy-relevant urban liveability composite measure and evaluating associations with transport mode choice. *International Journal of Health Geographics*, *18*(1), 14. https://doi.org/10.1186/s12942-019-0178-8

Hunt, L., & Jorgensen, M. (2003). Mixture model clustering for mixed data with missing information. *Computational Statistics & Data Analysis*, *41*(3–4), 429–440. https://doi.org/10.1016/S0167-9473(02)00190-1

Khorrami, Z., Ye, T., Sadatmoosavi, A., Mirzaee, M., Davarani, M. M. F., & Khanjani, N. (2021). The indicators and methods used for measuring urban liveability: A scoping review. *Reviews on Environmental Health*, *36*(3), 397–441. https://doi.org/10.1515/reveh-2020-0097

Meloni, C., Rocchi, B., & Severini, S. (2023). A systematic literature review on the rural-urban well-being gap in Europe. *Bio-based and Applied Economics*.

Neuhuber, T., & Schneider, A. E. (o. J.). *The role of public social expenditure for mitigating local income inequality: An investigation across spatial scales in Austria*.

Nussbaum, M., & Sen, A. (1993). *The quality of life*. Clarendon Press.

OECD. (n. d.). *What are equivalence scales?*

OECD. (2019). *OECD Economic Surveys: Austria 2019*. OECD. https://doi.org/10.1787/22f8383a-en

Perpiña Castillo, C., Vandecasteele, I., Aurambout, J. P., van Heerden, S., Ribeiro Barranco, R., Bosco, C., Jacobs, C., Martínez-Ruiz, I., Esparcia, J., & Pertoldi, M. (2022). *Urban-rural interactions and their territorial disparities*. Joint Research Centre (Seville site).

Pfeffer, F. T., & Waitkus, N. (2021). The Wealth Inequality of Nations. *American Sociological Review*, *86*(4), 567–602. https://doi.org/10.1177/00031224211027800

Sen, A. (1985). *Commodities and Capabilities*. North-Holland.

Sheikh, W. T., & van Ameijde, J. (2022). Promoting livability through urban planning: A comprehensive framework based on the "theory of human needs". *Cities*, *131*, 103972. https://doi.org/10.1016/j.cities.2022.103972

The Economist Intelligence Unit. (2023). *The Global Liveability Index 2023. Optimism amid instability*.

UNDP (United Nations Development Programme). (2022). Human Development Report 2021-22. *UNDP (United Nations Development Programme)*. http://report.hdr.undp.org,

UNDP (United Nations Development Programme). (2023). 2023 Global Multidimensional Poverty Index (MPI). *UNDP (United Nations Development Programme)*. ,

Wolbring, T., Keuschnigg, M., & Negele, E. (2013). Needs, Comparisons, and Adaptation: The Importance of Relative Income for Life Satisfaction. *European Sociological Review*, *29*(1), 86–104. https://doi.org/10.1093/esr/jcr042