Differences in Well-Being Across Cities: The Effect of Price Differentials on Household Welfare

Measuring and comparing inequality and poverty are central themes in the design and implementation of social policies, and they are prominent in political and economic debates. The well-being of individuals, the ultimate goal of social policies, depends on various factors, primarily the monetary income earned and the price levels at which this income is spent. Observed household expenditures do not solely reflect differences in consumption and, consequently, in well-being, but also differences in prices, both over time (inflation) and across regions (geographical cost-of-living disparities). Inadequate adjustments for these price differences lead to biased estimates of poverty (Nakamura, 2020).

This study aims to construct a deflator to measure the cost-of-living differential among urban centers and compare their welfare differentials. It proposes evaluating consumption patterns across cities by deflating household expenditures using an interregional superlative deflator. The study analyzes the influence of cost-of-living differentials on the welfare calculations of individuals at different points in the income distribution.

Building on the work of Deaton and Zaidi (2002) and Ravallion (2008), this line of research has adopted household welfare levels adjusted by a price index in constructing these indicators. Spatial price indices are essential when policymakers need to know not only who is poor but also where poverty is concentrated (Amendola et al., 2023). However, despite the importance of spatial price adjustments in measuring welfare for poverty and inequality analysis, many low-income countries do not apply spatial indices in their programs (Amendola et al., 2024; Nakamura, 2020).

To contribute to this topic, this study constructs a Cost-of-Living Index for major urban centers using the Country Product Dummy (CPD) methodology. In a recent World Bank study, Nakamura et al. (2020) indicate that this method, in addition to meeting several properties of index numbers, performs reasonably well when there are missing price observations across regions and detailed product- or item-level information is available. Failing to control for quality differences leads to biased estimates of price levels, inflating estimates for regions with higher-quality items and deflating those for regions with lower-quality items.

The Regional Cost-of-Living Index was calculated using data from the Household Budget Survey - POF (Pesquisa de Orçamentos Familiares) conducted by the Brazilian Institute of Geography and Statistics (IBGE), which provides information on the composition of household budgets. This survey investigates and measures consumption structures, expenditures, and incomes according to household and individual characteristics. The most recent POF covered twelve months between July 2017 and July 2018, visiting a sample of 58,039 consumption units with 178,369 residents, representing approximately 69 million families. In addition to POF data, this study used price data collected by the IBGE for the calculation of the Extended Consumer Price Index (Índice de Preços ao Consumidor

Amplo – IPCA), covering 264 goods consumer's market price across thirteen cities and nine product groups.

In 2022, 31.6% of the Brazilian population was below the poverty line (IBGE, 2023). However, the poverty line is uniform and applied across the entire national territory without accounting for the cost of living differences between cities. As a result, residents of regions with lower cost-of-living levels achieve higher welfare levels than those in regions with higher cost-of-living, even when their nominal incomes are similar.

The index constructed here includes non-durable goods and in-home food consumption. Durable goods were excluded due to their distinct nature, as each household purchases them infrequently. Outliers were treated, and the two datasets were merged using a variable translator provided by the IBGE. The final database consists of 12,962 households, corresponding to 20,235,203 individuals, who consume an average basket of 186 goods.

The Regional Cost-of-Living Indices (RCLI) were constructed to calculate the purchasing power of different population segments, compare welfare levels across income brackets, and assess the purchasing capacity of national benchmarks such as the minimum wage and governmental social benefits (like Bolsa Família). This variety of scenarios allows for evaluating comparative welfare levels across regions for individuals at different points in the income distribution.

With the RCLI established, the study proceeds to assess how purchasing power and household welfare vary across the surveyed cities. A positive correlation is observed between cost-of-living levels and household expenditure levels, the latter serving as an income indicator. There is a high correlation between cost-of-living levels and income levels, with wealthier cities also being more expensive. Cities above the horizontal axis have household income (expenditure) levels above the average and can be considered relatively wealthy, while those below are relatively poor. Cities to the right of the vertical axis are relatively expensive, and those to the left are relatively affordable.

The comparative cost-of-living data revealed that Brasília has the highest cost of living among the thirteen cities included in the study, 15% above the average. Rio de Janeiro, Goiânia, and São Paulo follow as the most expensive cities. Among the cities with the lowest comparative cost-of-living levels, Vitória stands out at 9% below the average, followed by Belém at 8% below, and the major northeastern capitals of Recife, Fortaleza, and Salvador, all 6% below. Once the cost-of-living indices were calculated, they were applied to the incomes of specific population segments, whether by income class or for recipients of certain income types, such as the minimum wage and Brazilian Social Assistance Program - BF (Bolsa Família).

A key income indicator for economically disadvantaged Brazilian households is the minimum wage. In 2018, its value was R$ 954.00, uniformly applied across the entire national territory. By incorporating the Cost of Living Index (CLI) calculated in this study, it is possible to determine a "real" value—adjusted for cost-of-living differentials among cities. The results suggested that Brasília, the city with the highest cost of living, a minimum wage recipient would have a purchasing power of only R$ 829.56, whereas in Vitória, this value would be R$ 1,048.35—26.4% higher. The cities classified as "wealthy" (Rio de Janeiro, São Paulo, Porto Alegre, Curitiba, and Brasília) exhibit minimum wage purchasing power below its nominal value due

to their high cost of living. Belo Horizonte, despite having an income level below the national average, also experiences a real minimum wage value lower than its nominal equivalent. In contrast, Fortaleza, Recife, Salvador, and Campo Grande all display real minimum wage values above R$ 1,000.00. Thus, while the nominal minimum wage is standardized nationwide, its purchasing power varies significantly across cities.

In addition, the study examines the base value of the Brazilian BF in 2018 (R$ 187.79) across the selected cities. To this end, the analysis considers the average household expenditures of program-eligible families and deflates them using the RCLI. Before adjusting for cost-of-living differences, the highest expenditures among eligible families were observed in Brasília (R$ 368.21), followed closely by Salvador (R$ 367.15). Conversely, the lowest values were recorded in Vitória (R$ 214.89) and Goiânia (R$ 243.78).

After adjusting for cost-of-living disparities, Salvador continues to exhibit the highest real value at R$ 389.35, while the second-highest is now observed in Belém, at R$ 357.63. Nominally, a BF recipient in Vitória receives R$ 152.26 less than a recipient in Brasília; after adjusting for CLI, the difference slightly increases to R$ 153.36. The two lowest adjusted values remain in Vitória and Goiânia, with only a marginal difference after cost-of-living correction—R$ 235.99 and R$ 233.01, respectively.

In summary, this study presents a tool to adjust for purchasing power differences among residents of thirteen major Brazilian cities and demonstrates that disregarding these differentials significantly affects population welfare, with varying impacts across different population segments. Thus, it offers a relevant instrument for social program analysis, enabling the calibration of programs and the evaluation of public policies.

Therefore, it was revealed that citizens among the poorest 10% in Brasília, despite earning incomes above the average of other cities in nominal terms, experience lower purchasing power than the average when their income is adjusted for the relative cost-of-living index. In other words, the welfare dimension related to access to goods and services for this segment of the population is particularly affected by the high cost of living, an effect proportionally more intense than in other cities.