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Distributional Impacts of Carbon Pricing on Accessibility Across Space and Incomes

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Abstract

Urban transport is a major driver of global CO2 emissions, and, without strong mitigation strategies, its contribution is likely to increase with the rapid urbanization occurring in developing countries. There is a growing consensus on the fundamental role of carbon pricing for reducing CO2 emissions. However, carbon pricing policies are frequently criticized and resisted for having adverse distributional impacts, especially when they impact transit services, the cheapest motorized transport means. Policies affecting transport costs have impacts on household well-being. In the short term, they impact how much income is left after commuting expenses are incurred. But more generally, they impact accessibility to jobs, which is associated with reduced unemployment, better-paid jobs, and more formal and permanent employment. Accessibility is also a key determinant of where people can afford to live in urban areas. Carbon pricing can therefore negatively impact households, especially the poorest, by locking them out of the labor market or constraining them to live in locations with high housing costs.

Keywords: *Distributional impacts, Carbon pricing, Accessibility, Incomes*

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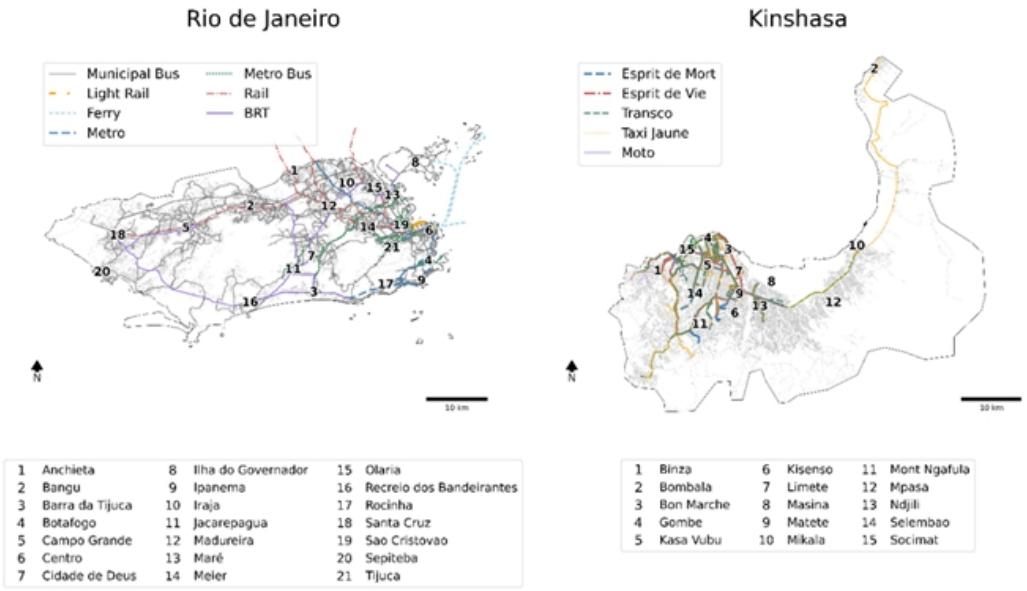
Background to the Study

Figure 1: Transit modes and lines in Rio de Janeiro and Kinshasa



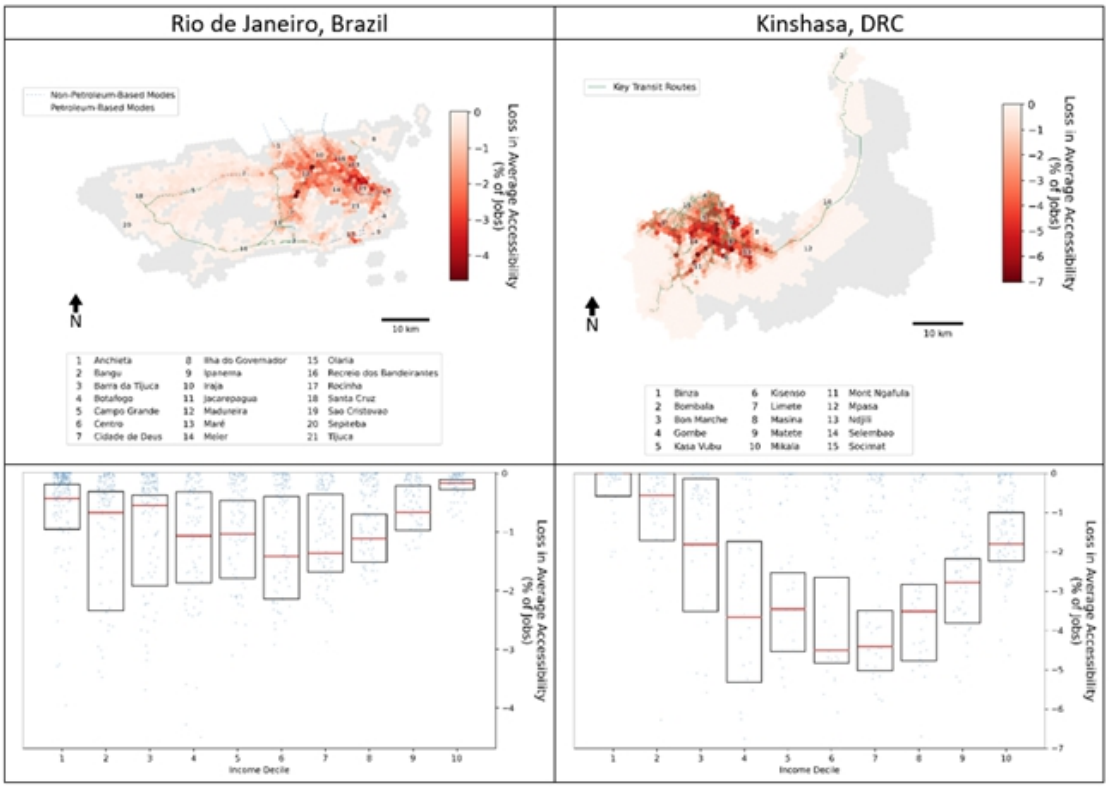
Source: Authors' calculations

Middle and High-Income Groups are Most Affected by Transportation Cost Increases

A hypothetical doubling of fuel prices in both cities would reduce accessibility (share of jobs accessible), mostly in areas relatively close to jobs and that have high accessibility levels before taxation. This highlights the spatial heterogeneity in carbon pricing impacts (Figure 2). The figure also suggests that fuel price increases are mostly progressive, with households in the bottom three income deciles being, on average, less impacted than wealthier income groups. As in many low- and middle-income cities, this is because many low-income households cannot afford public transport in the first place.

One important takeaway is that the variance in impacts on accessibility from the transport cost increase is larger within income groups than across. A naive approach to distributional impacts through the lens of only income groups would miss a big piece of the picture: the spatial dimension.

Figure 2: Loss in the share of accessible jobs using transit within 75 minutes in Rio de Janeiro (left) and Kinshasa (right), represented spatially (top) and by income decile (bottom) when fuel prices double.



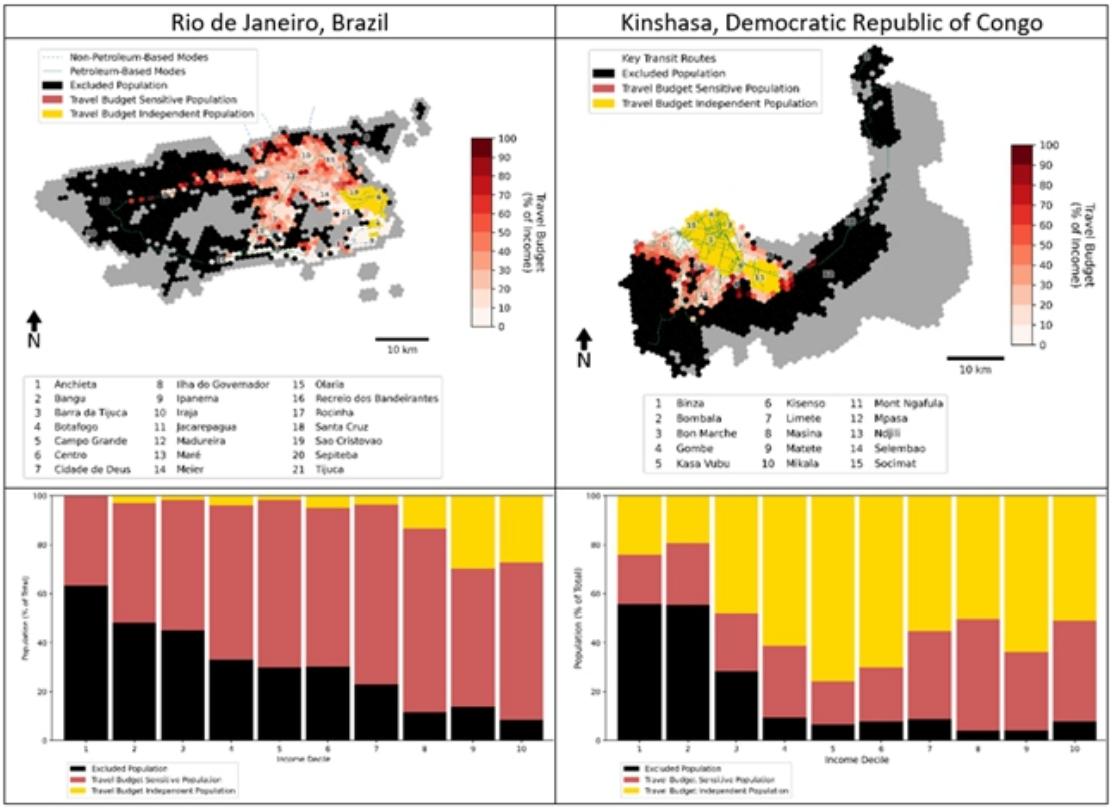
Source: Authors' calculations

Who is Excluded from Participating in the Labor Market?

Beyond job accessibility losses, an important consideration is whether households remain able to reach a "reasonable" pool of jobs, here defined as 10 percent of all jobs, despite the 100 percent fuel price increase. Indeed, a loss of accessibility of 5 percent may not mean much to a centrally located person but could exclude a less well-connected peripheral resident from the labor market.

Figure 3 disaggregates populations by their ability to access 10 percent of jobs. In yellow, households can always access at least 10 percent of all jobs through walking. In black, households can never reach 10 percent of jobs within the analyzed travel-time threshold, irrespective of how much they are willing to spend on transport. In red, the budget-sensitive population can reach 10 percent of jobs after spending a certain share of their income on transport, ranging from none in light red to 100 percent in dark red.

Figure 3: Populations' ability to reach 10 percent of jobs within 75 minutes in Rio de Janeiro (left) and Kinshasa (right), represented spatially (top) and by income decile (bottom) when fuel prices double



Source: Authors' calculations

In both cities, the travel budget-independent population (yellow) lives centrally, close to most of the jobs, the travel budget-dependent population (red) lives a little further away but benefits from access to public transport services, while the excluded population (black) generally lives in peripheral areas that are scarcely serviced by public transport. Labor market exclusion in the lowest income deciles dwarves the higher income groups. Sixty-five percent of the poorest in decile 1 in Rio de Janeiro cannot access 10 percent of jobs, up from 55 percent before the fuel price increase, compared to just around 10 percent of those belonging to the three highest income deciles, a number barely affected by the increased price of fuel. This results from the city's co-distribution of population and opportunities, as poorer households tend to live further away from jobs and transit services, where housing and land are more affordable.

Conclusion/Recommendation

Transit electrification and land-use policies can cushion against any negative impacts of carbon pricing policies. In Rio de Janeiro, after controlling for income, communities near the electrified rail and metro systems are relatively unaffected because they can rely on decarbonized transport systems to reach jobs, which are less impacted by carbon pricing.

Meanwhile, the compactness of Kinshasa reduces transit-dependency to access opportunities, since distances between jobs and residents are short and require few motorized transport legs and expenses. Compared to Rio de Janeiro, the travel budget-independent population is much higher in Kinshasa, irrespective of income group. This is testimony to the power of dense urban areas in connecting workers with job opportunities. These results show that land use and transport characteristics of both cities help them cushion against the negative impacts of carbon pricing policies. Local decision-makers must understand the interplay between socioeconomic, transport, and spatial characteristics to design policy and investment packages that abate urban transport emissions while protecting their constituents' well-being, including the most vulnerable.

Reference

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