Spatial Fairness Index: Measuring how well projects reach their intended beneficiaries

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Portfolio Footprints compare sub-national data on World Bank portfolio allocations with indicators of need, including poverty. Such analyses allow a better understanding of the spatial distribution of Bank investments and whether these investments are reaching their intended beneficiaries. In this note we present the Spatial Fairness Index (SFI), which provides a summary indicator of the inequality in projects’ investments with respect to a fair allocation benchmark. We present an application of this Index in the context of the World Bank portfolio in Bangladesh. We highlight some of the SFI’s main uses: to compare across sectors, projects and time, as well as to inform project design.

Spatially disaggregated data on World Bank portfolio allocations allow a better understanding of the link between investments and local needs. By disaggregating World Bank portfolio commitments or disbursements at the sub-national level, project allocations can be compared with sub-national poverty rates or other metrics. Existing visual tools like the Portfolio Footprint\(^1\) allow spatial targeting patterns to become clear by mapping project commitments against different welfare measures. However, these tools do not provide an exact measure of the disconnect between portfolio allocations and their targets.

The Spatial Fairness Index (SFI) provides an indicator of inequality in the distribution of investments. To compute the SFI, a benchmark fair distribution is identified. For instance, if the target is to reach the poor, the fair benchmark in the SFI could be an even distribution of resources among all the poor in a country. Figure 1 depicts a Lorenz curve with the 45-degree line as the chosen benchmark, where every target person in a given country receives an equal share of project investments or resources (line A). Line B represents the actual distribution of the resources. The SFI is based on the Gini coefficient, which ranges from 0 (perfect equality) to 1 (perfect inequality). The *lorenz* command in STATA can be used to compute the SFI.

The SFI requires sub-national level data on: (i) project allocations; and (ii) target population for the project. Depending on the level of disaggregation of the data, the SFI will require some

assumptions about how the portfolio reaches specific groups. For instance, if project commitment data is only available at the district level, the SFI requires an assumption about the distribution of the project investments among the potential beneficiaries within a district. The next section shows how the SFI was computed with district-level data in the case of Bangladesh.

The case of Bangladesh

Bangladesh is currently the largest IDA borrower. Its active portfolio (as of December 2018) comprised 40 projects (37 IPFs and 3 P4Rs) varying in size, from USD 15 million to USD 745 million. The current World Bank portfolio commitment in the country stands at USD 12.62 billion, which represents about 2 percent of the country’s GDP. The country has made sustained progress in reducing poverty in the last decade; still, about 1 in 4 people are considered poor according to official statistics.2

Data and assumptions: Team leaders from all projects in Bangladesh provided estimates of their project’s commitments at the district level. This information was combined with poverty rates and other target indicators (access to electricity; primary occupation; education outcomes etc.) for the 64 districts of the country, to allow exploring the link between investments and needs.3 Poverty and other key metrics were obtained from the Household Income and Expenditure Survey (HIES) 2016/17, which is representative at the district level. For this analysis, it was assumed that the projects’ commitments within a district were distributed uniformly among the target population.

In Bangladesh, there is significant variability in the distribution of portfolio commitments across districts (Figure 2). More than a third of the portfolio is allocated to 10 percent of the country’s 64 districts. In absolute terms, the districts that receive the largest shares of the portfolio are Dhaka, Chittagong and Narayanganj. In terms of portfolio allocations per poor person, the top 3 districts are Narayanganj, Munshiganj and Madaripur, all within the Dhaka division.

When poverty is chosen as common target for the portfolio, the spatial allocation of investments is weakly linked to the distribution of the poor population. If the total commitments were evenly distributed amongst the poor, the amount received per poor person would be USD 261. The real distribution ranges from USD 53 to 2,791. Next, we summarize this inequality using the SFI. As shown in Figure 3, the bottom 20 percent of the poor get allocated around 5 percent of the total portfolio. The SFI Gini coefficient is 0.506 for the full portfolio. The spatial disconnect between the portfolio and poverty can be explained by the fact that investments have different objectives and target populations. Thus, we compare the SFI across sectors in the Bangladesh portfolio grouped by the


four Country Partnership Framework (CPF) Focus Areas: (1) Growth and Competitiveness; (2) Social Inclusion; (3) Climate & Environment Management; and (4) Governance.

Figure 4 shows how the link between project allocations and poor population varies by CPF pillar. As expected, Social Inclusion projects (represented in blue) are more likely to invest in districts with larger poor populations. On the other hand, projects in Growth and Competitiveness predominate in districts where the poor population is smaller and incomes higher (with the exception of Dhaka). Figure 5 presents a summary of these patterns using the SFI.

Social Inclusion projects (CPF Area 2), which invest in portable assets of the population, have a more favorable SFI with respect to poverty. This is expected, since this sector includes projects in education and social protection, which explicitly target the poor. For CPF Areas 1 and 3, the SFI shows that portfolio allocations among the poor population are much less equitable. These investments include infrastructure projects that are focused on specific areas. For CPF Area 3, which includes projects in disaster relief and environmental sustainability, the bottom 80 percent of districts receive only around 8 percent of the allocations.

The previous example illustrated an application of the SFI using the poor population as a target. However, other target metrics could be chosen.

Using the SFI at the project level

For a specific project, the SFI can be applied to measure whether its investments are reaching the project’s intended target population. For instance,
one of the education projects in Bangladesh aims to reach children out of school, ages 8 to 14. The analysis using the SFI highlights that there is an unequal allocation of this project resources among its intended beneficiary population: around 60 percent of Bangladesh’s out of school children receive only 20 percent of the project’s allocations. This inequality leads to an SFI of 0.56.

The high SFI for this project is partly because 10 districts do not receive any portion of the resources. If the investments were redistributed so that these districts could receive a more equitable share, the SFI would improve to 0.41. Figure 6 compares the current project’s SFI with a scenario where this redistribution is simulated. This example shows how the SFI can serve as tool to improve the equity of allocations at the project design stage by comparing different allocation scenarios.

Lesson Learned

The SFI provides a summary indicator to facilitate the comparison of the inequality of investments across projects, sectors and time. The SFI can be used to assess poverty targeting of the portfolio, but the latter example illustrates, its methodology is not limited to this. At the project level, the SFI can be applied to any target beneficiary population. In the case of Bangladesh, the SFI estimation is carried out with district-level data of portfolio allocations; however, if beneficiary-level data were available, the SFI would yield an even more robust estimate of portfolio targeting inequality. The SFI’s main use lies in that it provides a tool to compare targeting across different activities and to compare ex-post targeting with ex-ante projections. For pipeline activities the SFI presents a way to inform project design and particularly the spatial allocation of project commitments. To facilitate this, the authors are preparing an interactive tool which allows TTLs to simulate the targeting of different project allocations.

The interpretation of the SFI must be cognizant of implementation realities. A completely equitable distribution of the portfolio may not be feasible, nor desirable. For instance, there may be indivisibilities and budget constraints, and administrative and economic centers may be expected to receive disproportionate portfolio allocations for reasons of bureaucratic efficiency and economic return. Thus, an ideal SFI benchmark cannot be determined yet. Moreover, comparisons of SFI across countries and portfolios may be misleading due to different compositions of portfolio investments.

About the Authors

Sylvia Cesar, Joaquin Endara, Maria Eugenia Genoni, Johannes Hoogeveen, and Nethra Palaniswamy are part of the Bangladesh team in the World Bank’s Poverty and Equity Global Practice for South Asia. Special thanks to comments provided by Benu Bidani, Nga Thi Viet Nguyen, and Dandan Chen.