ASIAN EVALUATION WEEK 2024

Innovations for Influential Evaluation

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Independent Evaluation ADB

亚太财经与发展学院
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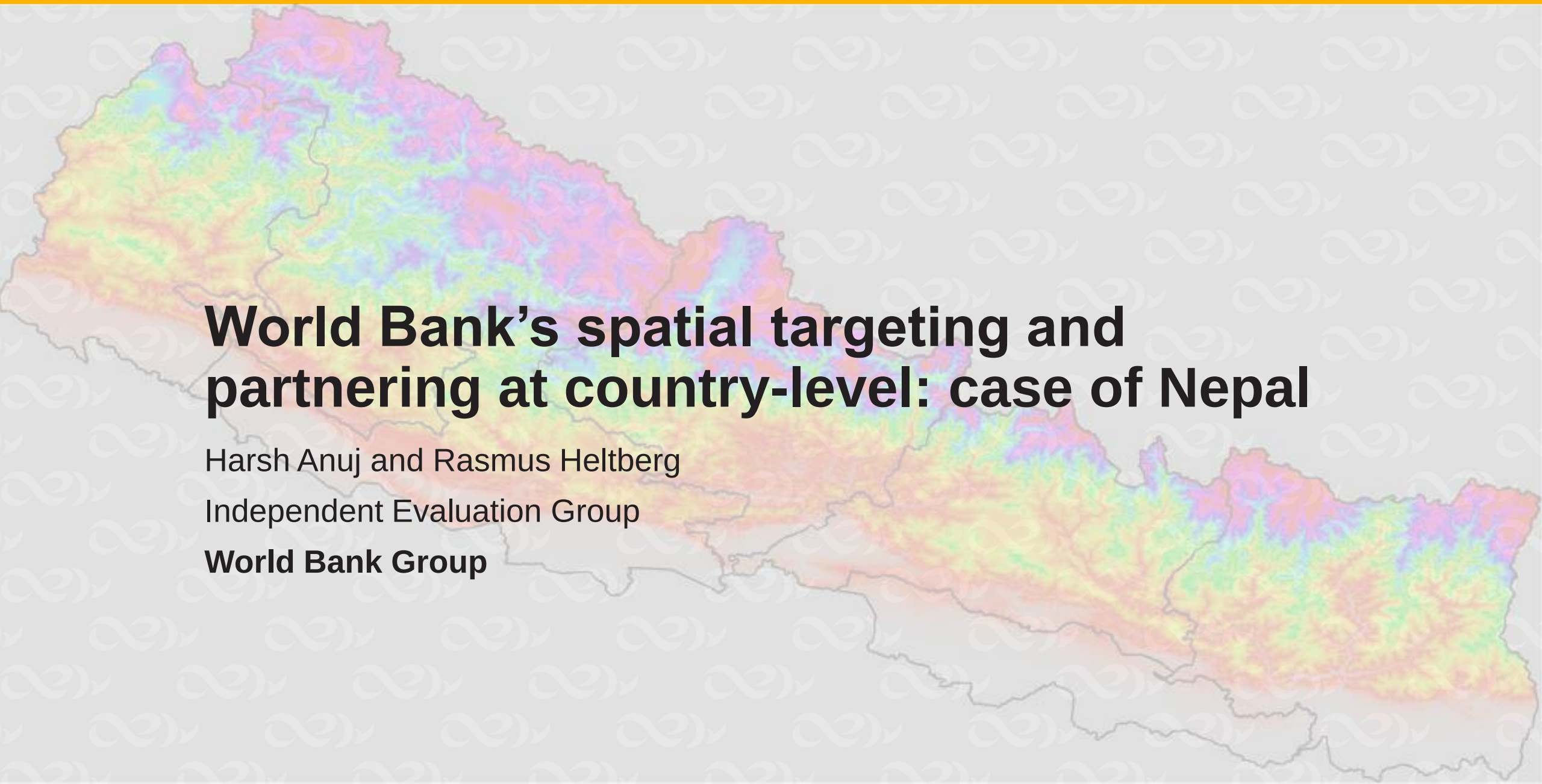

World Bank's spatial targeting and partnering at country-level: case of Nepal

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Independent Evaluation Group

World Bank Group

Independent Evaluation ADB

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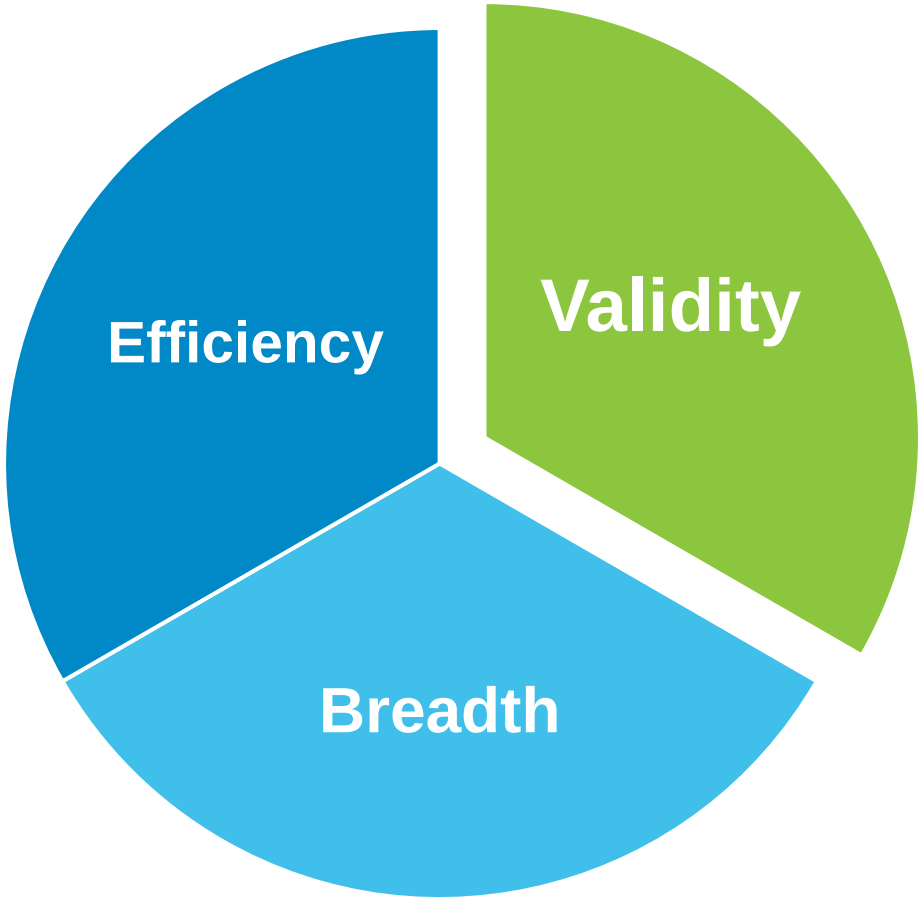
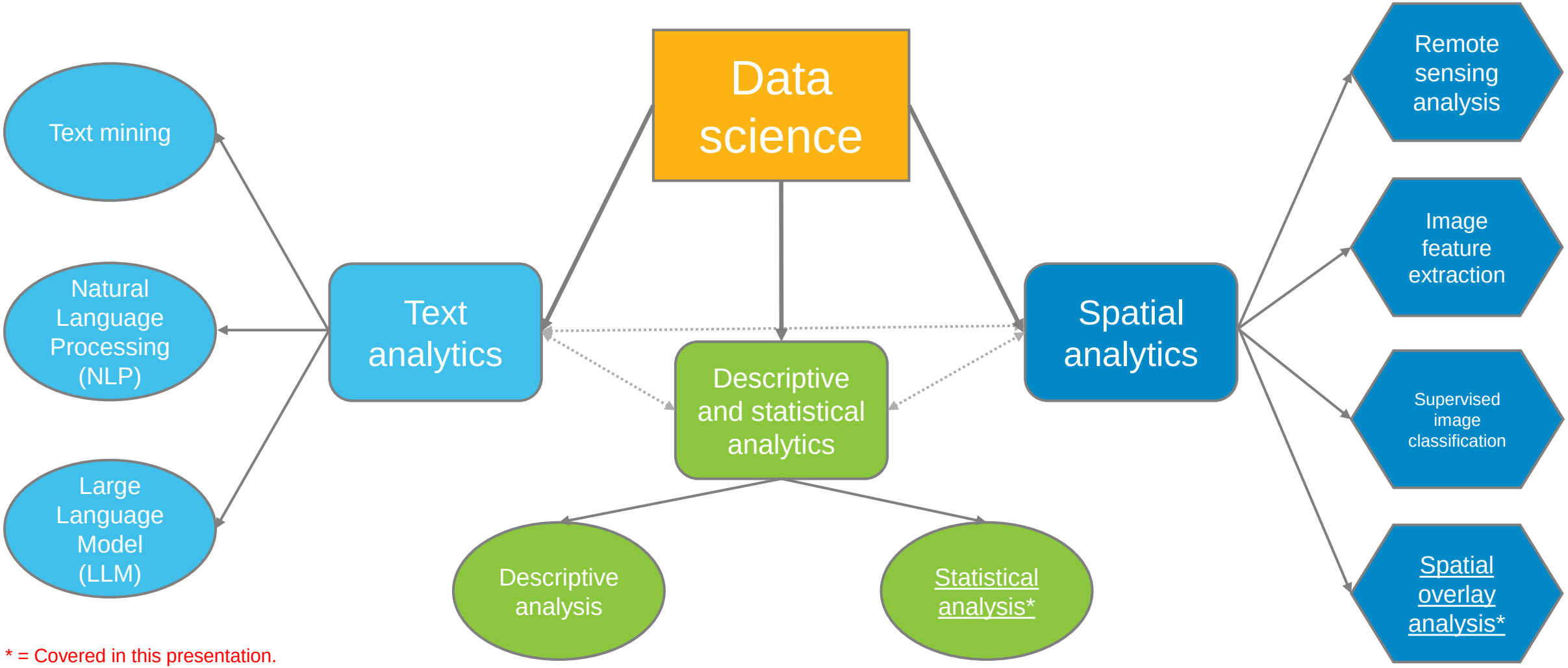
Data science in IEG: needs

- Untapped value in GIS, administrative, and web data.
- Missing out on wealth of text and image as data.
- Complex thematic portfolios to identify.
- Expensive, labor-intensive, time-consuming manual review.
- Reliability and accuracy challenges.
- Crowding out of more in-depth analysis.

Data science in IEG: benefits



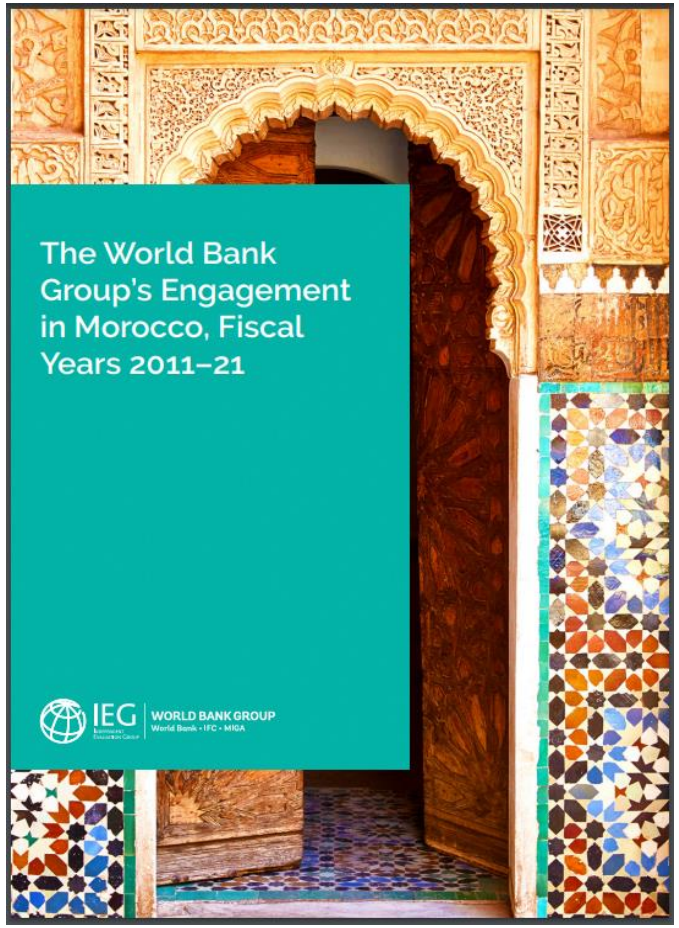
Data science in IEG: types



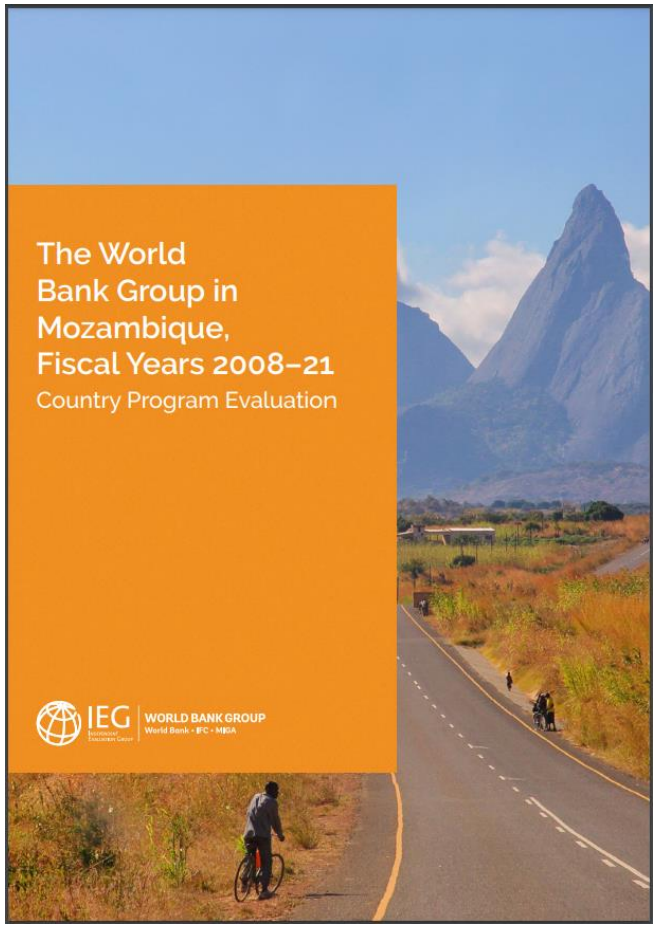
Note: * = Covered in this presentation.

Other examples

Spatial targeting analysis | Development partnerships analysis



Spatial targeting analysis



Note: Cntrl + click on images to view reports.

Nepal Country Program Evaluation

Assessment of WB's spatial targeting in Nepal

Question

How relevant was the spatial targeting of World Bank financing in the country given the varied development needs of its provinces?

Objective

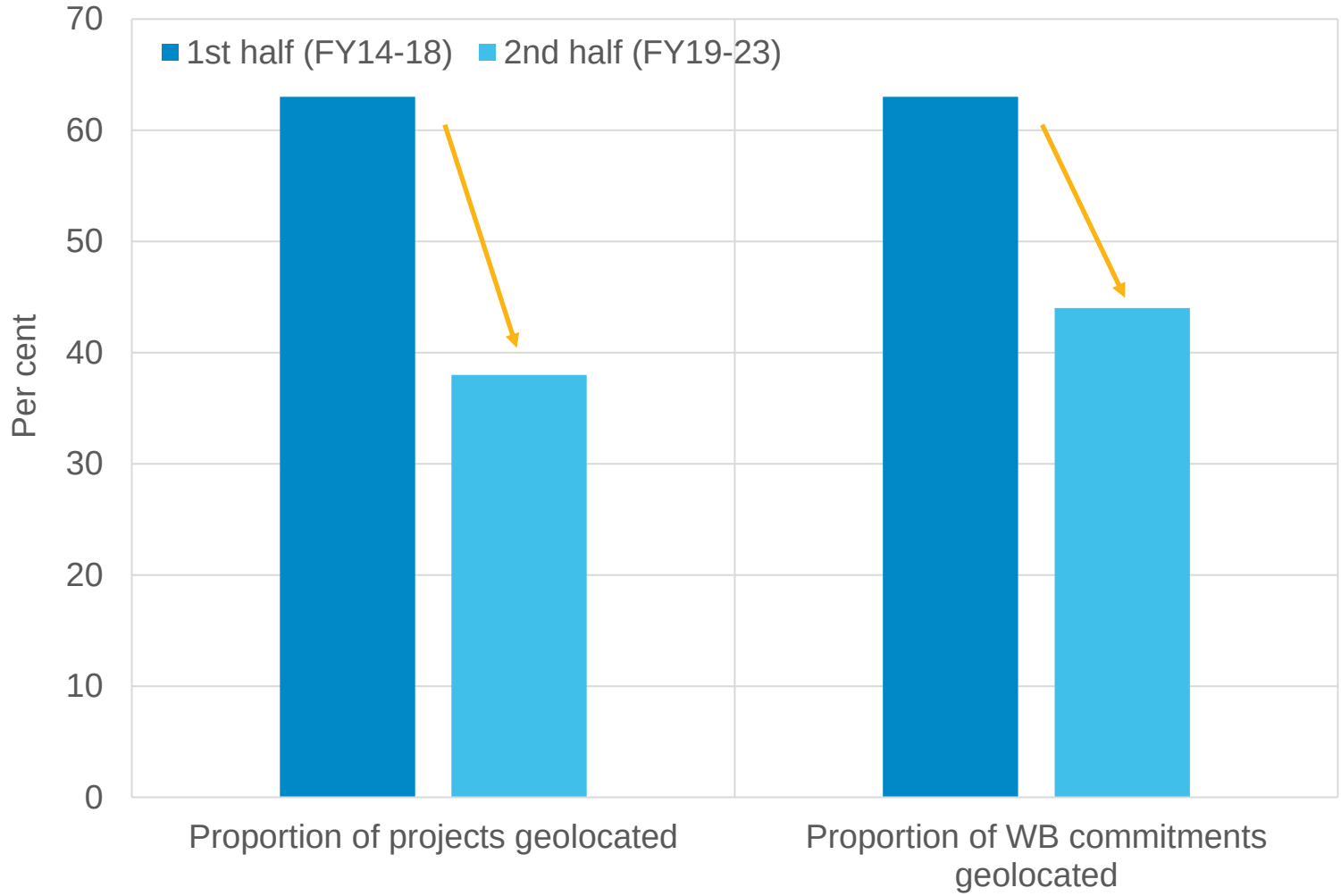
Understand quantitatively whether and to what extent higher volumes of financing were committed to provinces with higher development needs.

Approach

Analyze geospatial data on the planned implementation sites of World Bank financing projects in the evaluation portfolio to understand:

- The degree of spatial targeting of WB portfolio.
- The provincial distribution of WB financing commitments and development needs.
- The relationship between provincial WB financing commitments and development needs.

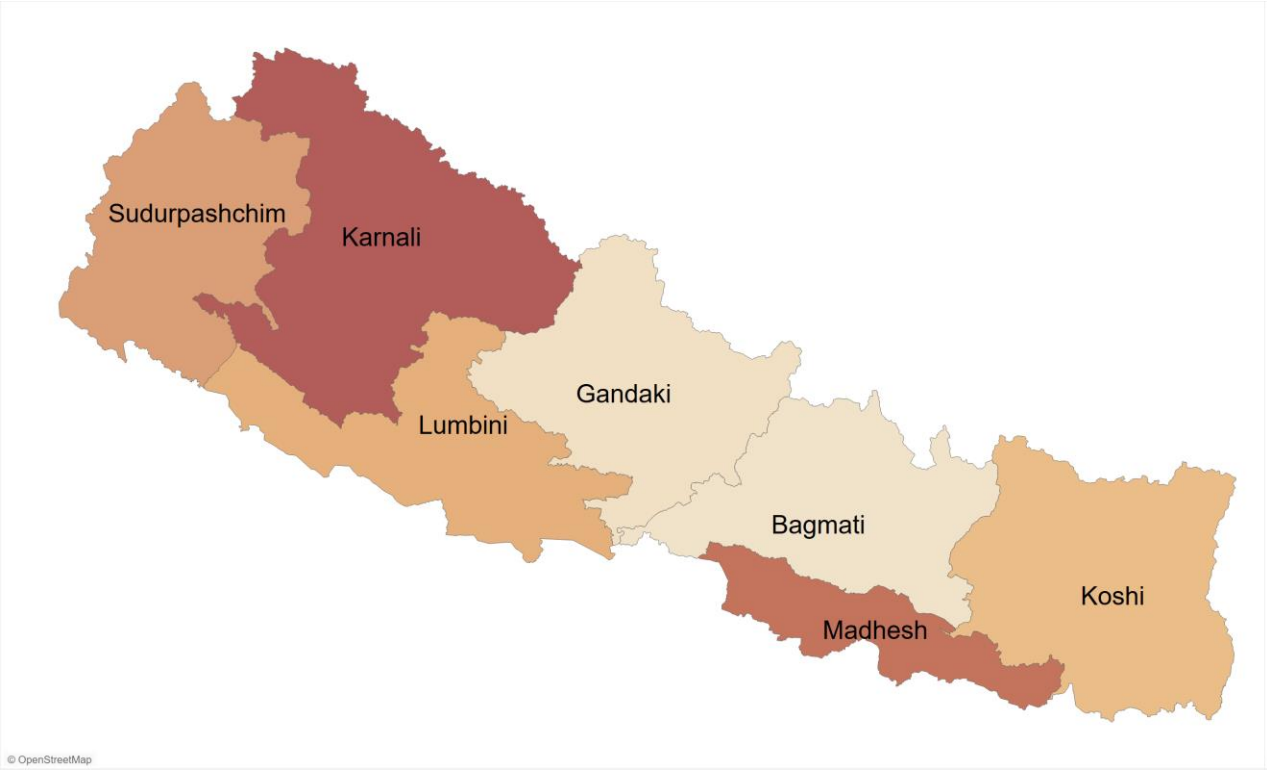
Degree of spatial targeting of WB portfolio



Data source: IEG (2024).

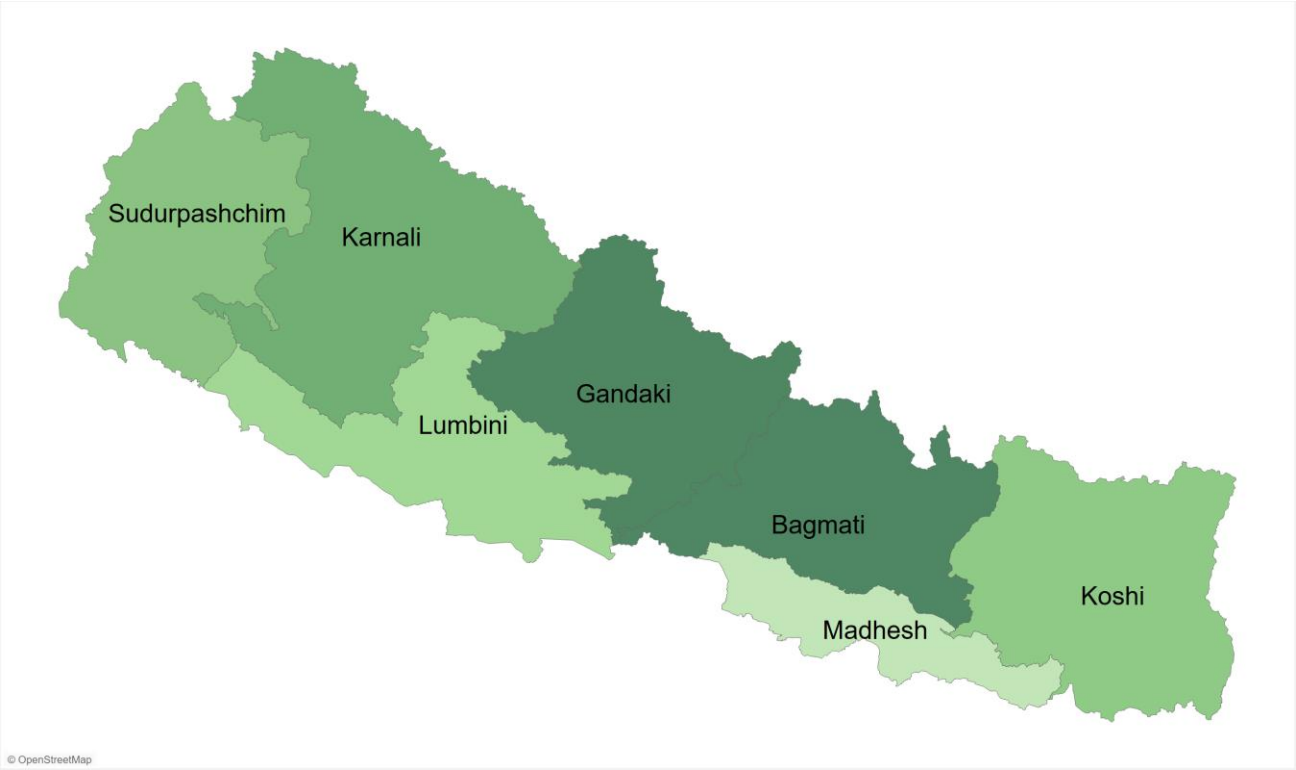
Provincial distributions of WB commitments and development needs

Provincial Multidimensional Poverty Index



Note: Darker shades = higher multi-dimensional poverty.

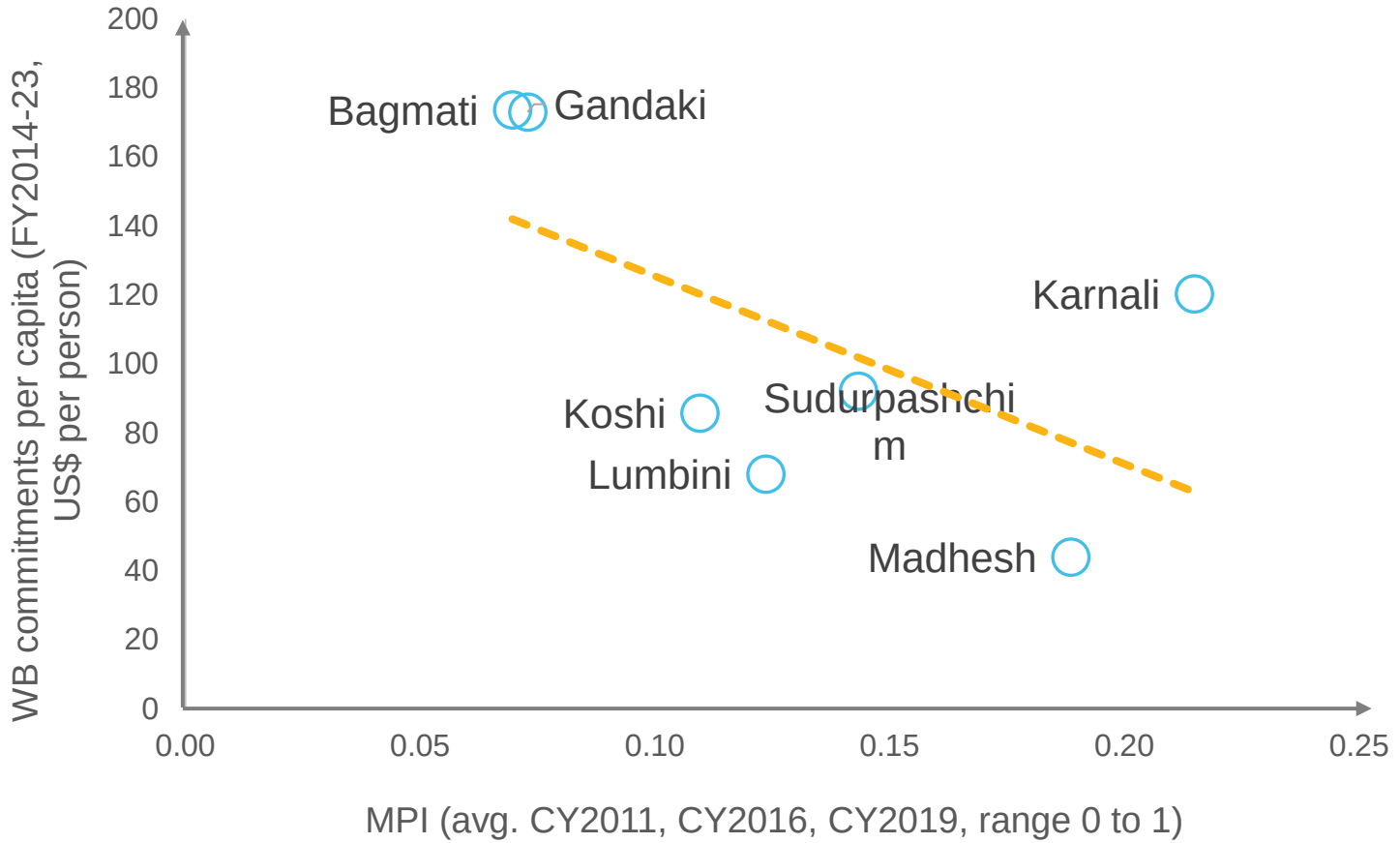
Provincial World Bank financing commitments per capita



Note: Darker shades = higher World Bank financing per capita.

Data sources: IEG (2024), Alkire, S., Kanagaratnam, U., and Suppa, N. (2023).

Relationship between provincial WB financing commitments and development needs



Note: Higher X-axis values = higher multi-dimensional poverty.

Data sources: IEG (2024), Alkire, S., Kanagaratnam, U., and Suppa, N. (2023).

Assessment of WBG's partnering in Nepal

Question

How coherent was WBG financing in the selected working areas in the country given the role of development partners?

Objective

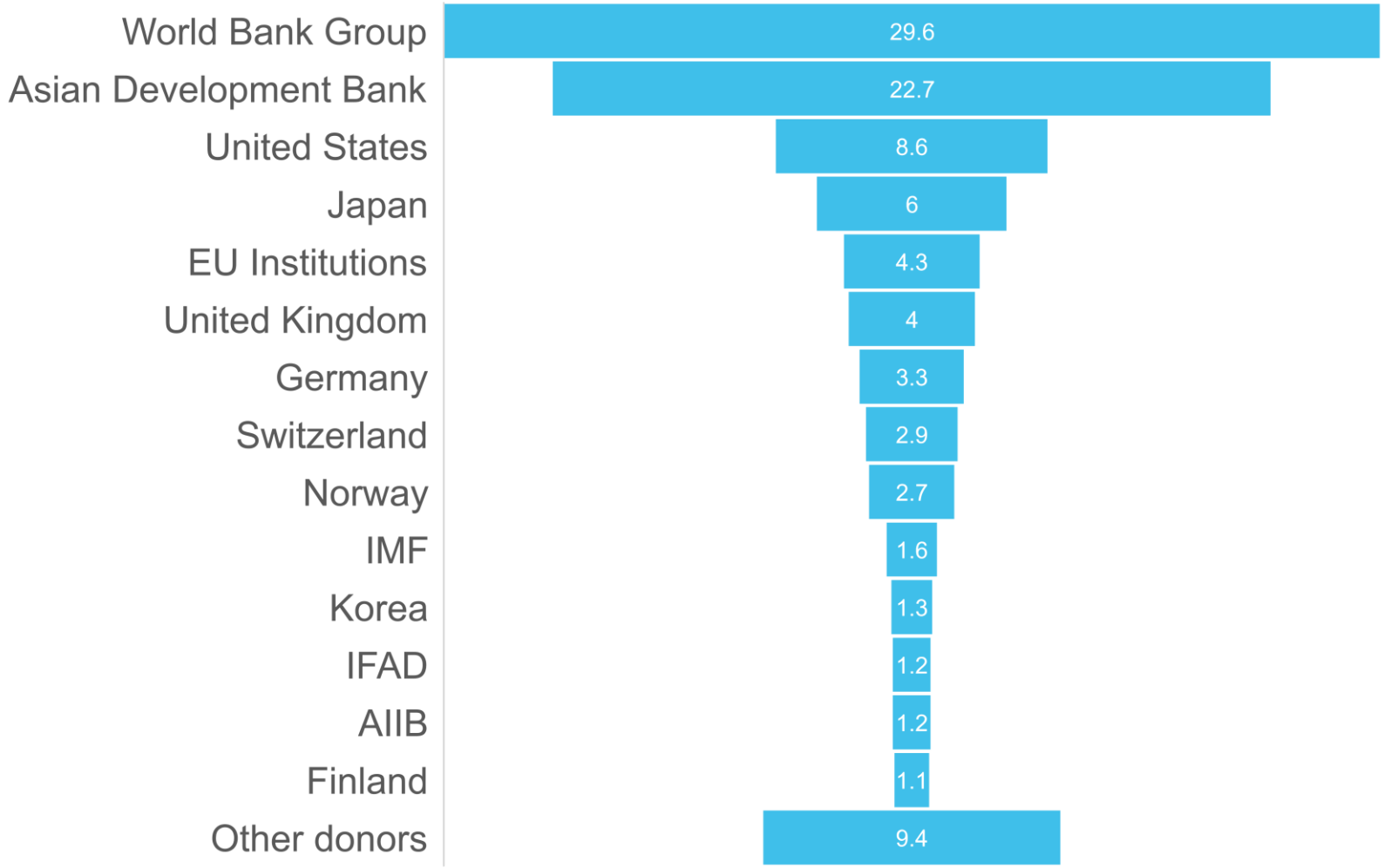
Understand quantitatively the position of the WBG vis-à-vis other financiers in key thematic areas.

Approach

Analyze data on 'foreign aid' commitments to the country to understand:

- WBG's importance in overall financing commitments by development partners.
- The type of role WBG had in each key thematic area vis-à-vis others.

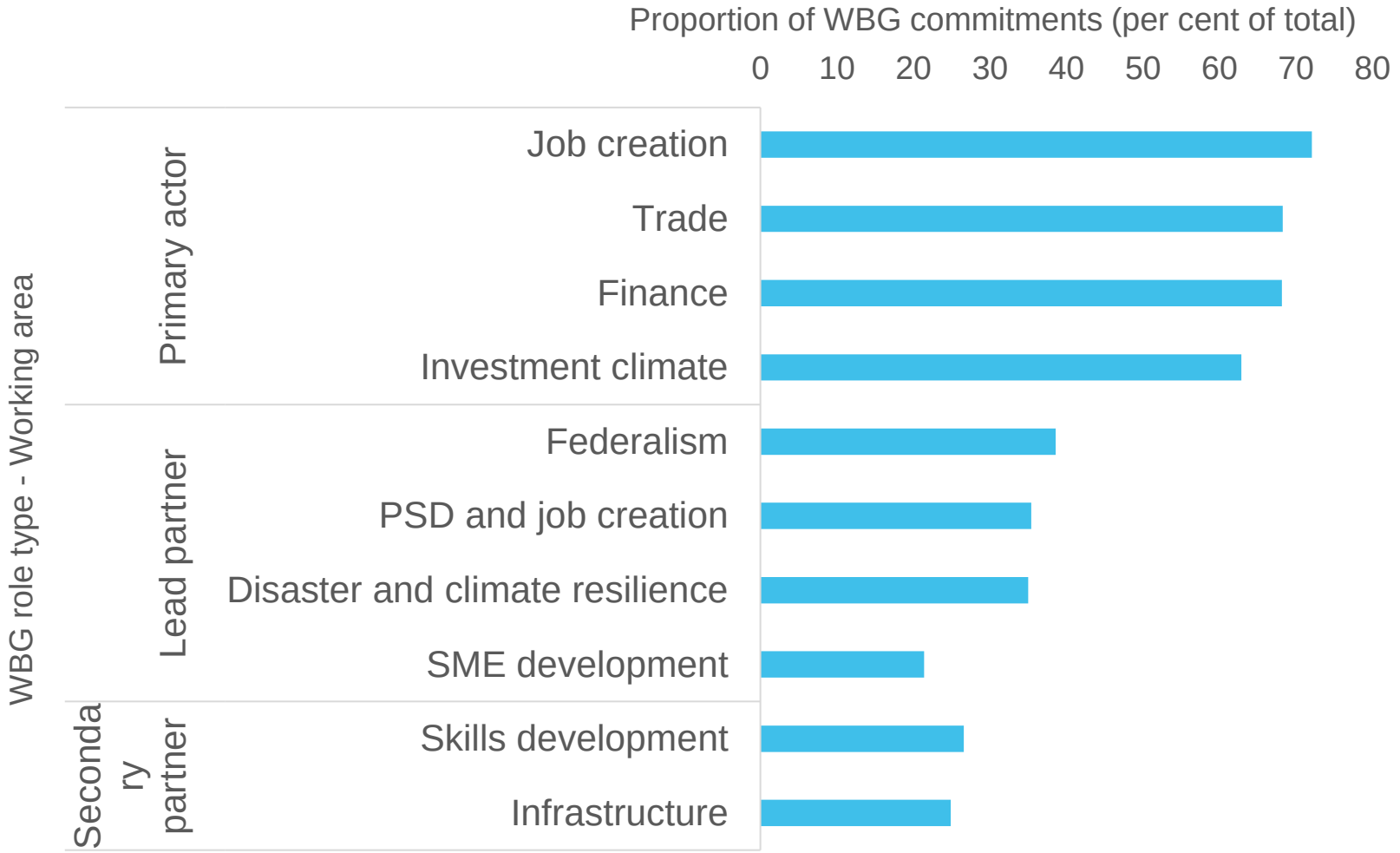
WBG's importance in overall financing commitments



Data source: OECD (2023).

WBG's role type in each working area

Type	Definition
Primary actor	• Highest share of financing. • Higher degree of concentration.
Lead partner	• Highest share of financing. • Lower degree of concentration.
Secondary partner	• 2nd highest share of financing. • Lower degree of concentration.



Data source: IEG (2024), OECD (2023).

Key challenges and lessons

Challenges	Lessons
▪ Risk of data driving the enquiry.	▪ The evaluation questions should be a constant guide. ▪ Data science one of several components of robust mixed-methods design.
▪ Risk that data science findings not relevant and not used.	▪ Need constant dialogue between data scientists and other evaluation team members ▪ Repeated iterations maximize data science findings' relevance. ▪ Triangulation with results from other analyses is important.
▪ Scaling up and mainstreaming data science innovations not easy.	▪ IEG learned over time with each application of data science, allowing improvements over time. ▪ Having an in-house data science team with leadership support helped in this. ▪ IEG used successful past applications to demonstrate data science's value to teams.

Thank you!

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Methodological annex

Assessment of WB's spatial targeting in Nepal

Methodology

- IEG used data on planned project implementation sites from Bank's operations system and proxied provincial needs with the multi- dimensional poverty index (MPI) from Alkire, S., Kanagaratnam, U., and Suppa, N. (2023).
- IEG then used the proprietary geospatial analysis software (Arc GIS Pro) to calculate province-wise counts of implementation sites for projects, using sub-national boundaries from UN OCHA FISS.
- Provincial commitments were estimated by assuming that the distribution of provincial commitments of a project followed the same distribution as the provincial count of planned project implementation sites.
- Finally, the provincial per capita commitments and MPI values were plotted using a scatterplot to describe the sign of the relationship between the two variables.
- Various alternative specifications were tested to ensure robustness of the observed relationship. These were: total commitments instead of per capita, for two evaluation sub-periods instead of the full evaluation period, Human Capital Index (HDI) instead of MPI, outlier removed and counts of planned project implementation sites instead of estimated provincial commitments.

Estimating provincial WB commitments

First, a project's commitments to a province were calculated as:

$$C_{ij} = T_j \times (\frac{S_{ij}}{S_j})$$

where:

- C_{ij} = Commitments to province i from project j.
- T_j = Total commitments of project j.
- S_{ij} = Count of project j's planned implementation sites in province i.
- S_j = Total count of project j's planned implementation sites in all provinces. Counts were estimated using ArcGIS Pro.

Then, total commitments to a province were calculated as:

$$C_i = \sum_{j=1}^{N} C_{ij}$$

where:

- C_i = Total commitments to province i.
- C_{ij} = Commitment to province i from project j.
- N = Number of provinces in the country.

A note on multi-dimensional poverty index

The MPI for an administrative unit is calculated as follows:

- For each individual in an administrative unit, estimate whether they are deprived or not based on cut-off values for 2 health indicators (nutrition and child mortality), 2 education indicators (years of schooling and school attendance), and 6 living standards indicators (cooking fuel, sanitation, drinking water, electricity, housing, and assets). For some indicators, if one member of the household is deprived, then all are assumed to be deprived.

- Indicators are aggregated as follows: equal weight within each category (health, education, assets), and equal weight across categories.
  - Each health and education indicator has weight = 1/6 or 0.167, and each asset indicator has weight = 1/18 or 0.556. The weights add up to 1.
  - For each indicator in which a person is deprived, the weight of the indicator is added up. So, if a person is deprived on none, then their score is 0, and if on all their score is 1 etc. This gives the deprivation score for each person.

- A person is identified as being poor if they are deprived in at least one-third of the weighted MPI indicators. Or, if their deprivation score >= 0.33 (?).

- The incidence of poverty, or the headcount ratio (H), is estimated as the number of poor divided by total population in an administrative unit.

- The intensity of poverty (A), is calculated as the average percentage of weighted deprivations experienced by the poor. That is, the average deprivation score of the persons identified as being poor above.

- The adjusted poverty headcount ratio (MPI) combines H and A multiplicatively, calculated as: MPI = H x A. So, if an admin unit has 25% poor, with an average deprivation score of 0.5, then the MPI = 0.25 * 0.5 = 0.125.

Assessment of WB's spatial targeting in Nepal

Key limitations

- Data was not available at more granular administrative levels.
- Estimates of the provincial distribution of project commitments might have differed from ground truth.
- Actual project implementation sites (i.e., ground truth) might have differed from the planned project implementation sites.

Assessment of WBG's partnering in Nepal

Methodology

- Data on donor commitments was sourced from the OECD Creditor Reporting System (CRS) database.
- Donor financing was categorized into the evaluation's thematic/sub-thematic areas by mapping OECD sector codes to the corresponding areas.
- The evaluation quantified the WBG's role vis-à-vis other donors in each of the evaluation's thematic areas by considering the WBG's rank in commitment volumes, and the respective degree of concentration of financing estimated by the Herfindahl-Hirschman Index (HHI).
- Based on the above two measures, a typology of WBG's position in each working area was determined with the following categories: 1) primary actor; 2) lead partner; and 3) secondary partner.

Estimating level of donor concentration

First, HHI values and WBG shares in each working area were calculated as:

$$HHI_i = \sum_{j=1}^{N_i} \left(\frac{C_{ij}}{\sum_{j=1}^{N_i} C_{ij}}\right)^2$$

where:

- HHI_i = Herfindahl-Hirschman index for working area i.
- C_{ij} = Commitments of development partner j to working area i.
- $\frac{C_{ij}}{\sum_{j=1}^{N} C_{ij}}$ = Share of development partner j in total commitments to working area i.
- N_i= Number of development partners with non-zero commitments to working area i.

Then, the HHI class, or the level of concentration, for each working area was calculated as:

$$HHIC_i = \begin{cases} 1 \; if \; HHI_i > \overline{HHI} \\ 0 \; if \; HHI_i \leq \overline{HHI} \end{cases}$$

where:

- $HHIC_i$ = Herfindahl-Hirschman index class for working area i.
- $\overline{HHI} = \frac{\sum_{i=1}^{M} HHI_i}{M}$ = Average HHI value for all working areas, where M = number of working areas.

Assessment of WBG's partnering in Nepal

Key limitations

For internal validity, data on WBG commitments as reported to the OECD was used, which differed from the data from WB operations systems used elsewhere in the report.

Data on financing commitments of two significant donors to Nepal- China and India- was not reported to the OECD and therefore was not included.

Quality of mapping of development partners' projects to evaluation working areas dependent on quality of mapping of these to the OECD sector codes.