

Suggestions for Securing Climate Resilient PPP Projects

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Jongyeon (Jon) Lee

KDI School of Public Policy and Management



C O N T E N T S

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Why Climate Change Matters in PPP?

II — Policy Suggestions

How to Secure Climate Resilient PPP Projects?

PART

I

Introduction

Why Climate Change Matters in PPP?



Four Seasons in Korea



Four Seasons in Korea?



Four Seasons in Korea?



JAN: Puffer jacket	FEB: Puffer jacket	MAR: Puffer jacket	APR: Right now!
MAY: Short sleeve	JUN: Short sleeve	JUL: Short sleeve	AUG: Short sleeve
SEP: Short sleeve	OCT: Right now!	NOV: Puffer jacket	DEC: Puffer jacket

Osong Underpass Disaster



July 13-15, 2023

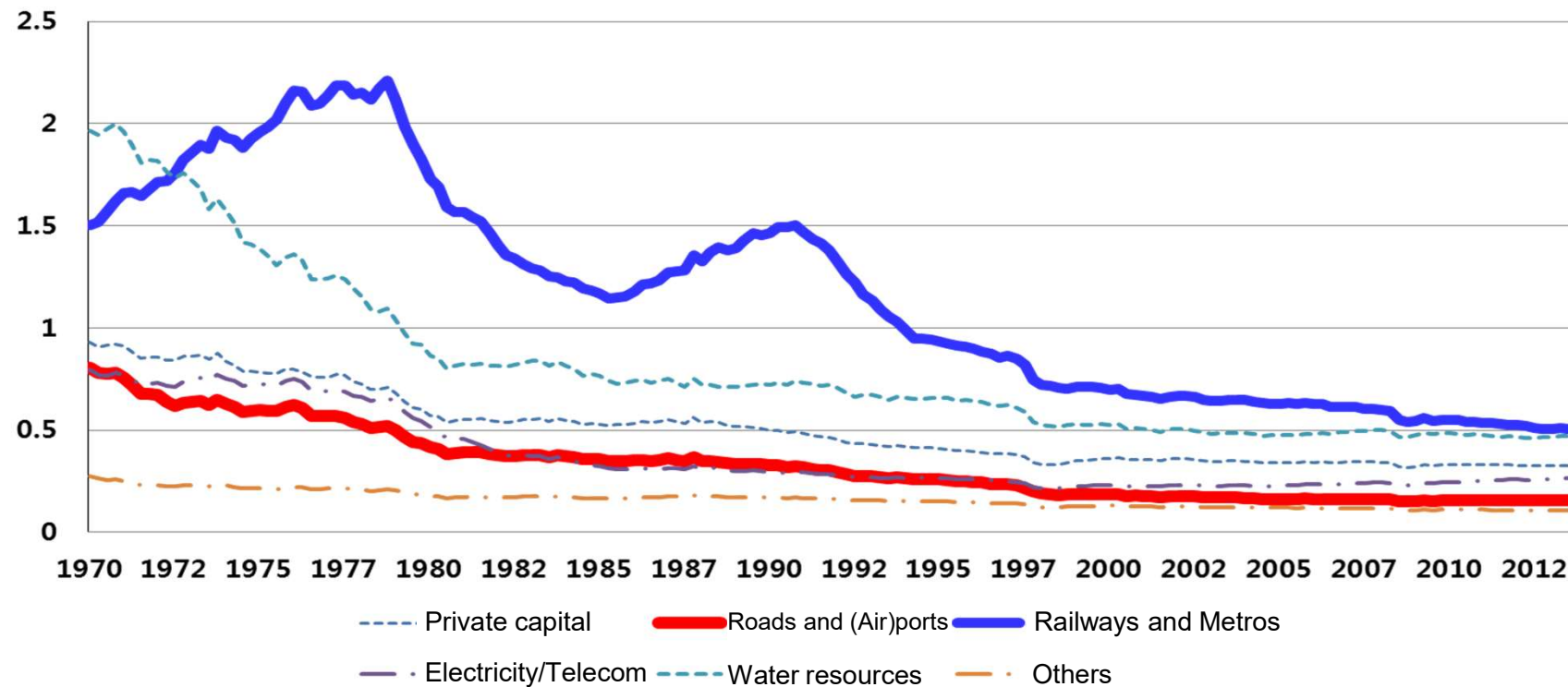
- More than 500mm of rain poured.

July 15, 2023

- The embankment burst 550 meters away.
- Up to 60,000 tons of water filled the underpass in just 2 to 3 minutes.
- 17 vehicles were stranded and 14 people lost their lives.

Declining Marginal Product of Infrastructure

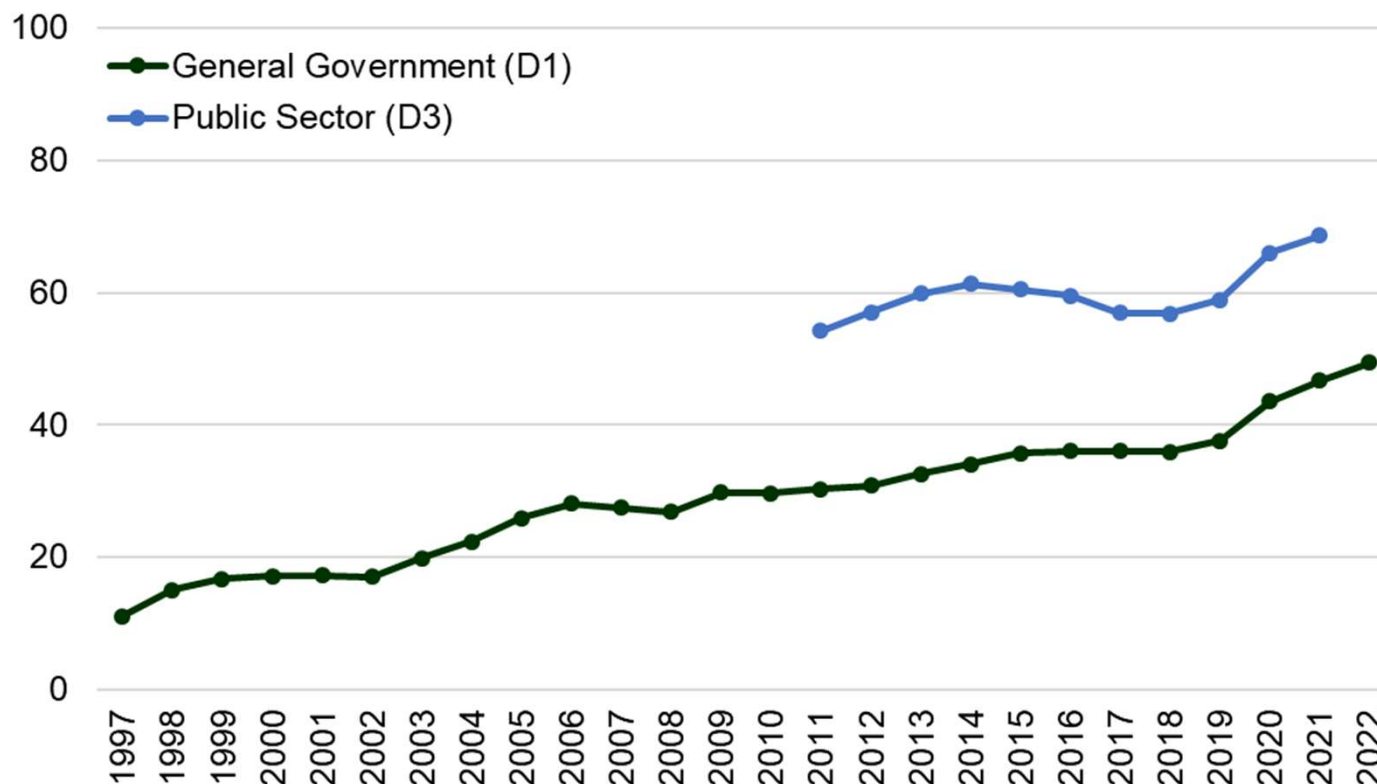
- The contribution of new infrastructure investment to economic growth is expected to be significantly lower than during the development era.



Sources: Kim and Song (2014, KDI Research Monograph)

Increasing Public Sector Debt

- With national debt at an all-time high, if the trend of emphasizing fiscal soundness continues, spending on infrastructure maintenance and repairs will be cut first.

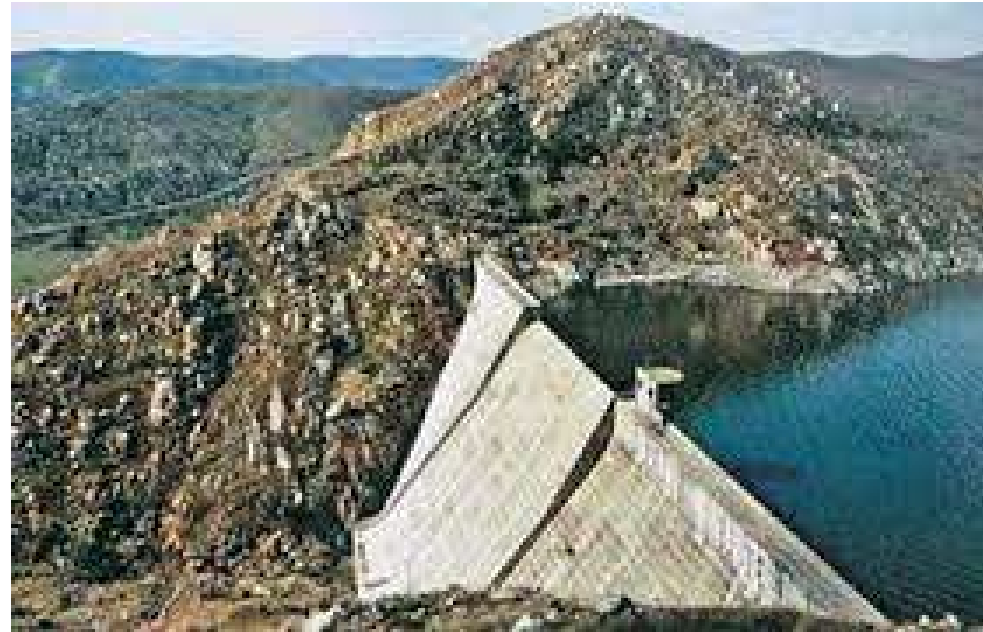


Little Interest in Politics

- Politicians are interested in projects that stand out and help them get (re-)elected.



San Vicente Dam



- 1943**
 - Built with a height of 67m and a storage capacity of 101.1 million tons
- 1991**
 - Expansion promoted due to San Diego's worst drought
- 2009-14**
 - Remodeled to a height of 102.7m and a storage capacity of 299 million tons
- 2022**
 - Water supply during California's worst drought
- 2023**
 - Flood protection from the first hurricane to land in California in 84 years

Summary

- Why climate change matters in PPP?
 - Increasing need for responding to extreme weather events.
 - Demand for improving existing facilities to be more climate resilient will increase rather than for new investments.
 - Improvements require long-term and continuous efforts, but they are not noticeable and are pushed out of political priorities.
 - When fiscal conditions are poor, conventional government procurements become more difficult.
 - Climate change reinforces the importance of PPPs that enable timely investment.

PART

II

Policy Suggestions How to Secure Climate Resilient PPP Projects?



I. Profitability: Hybrid Methods

- Additional costs to respond to climate change should be recovered by increasing profitability through government cost sharing or operation of auxiliary facilities.
 - e.g. In accordance with World Health Organization (WHO) standards, the Seoul Metropolitan Office of Education refrains from holding outdoor classes even when the fine dust concentration is above $50\mu\text{g}/\text{m}^3$ (2017).
 - e.g. The Ministry of Land, Infrastructure and Transport prepared river design standards that strengthened flood response standards by newly including climate change scenarios and regional frequency analysis to prepare for damage such as local heavy rain caused by climate change (2019).

I. Profitability: Hybrid Methods

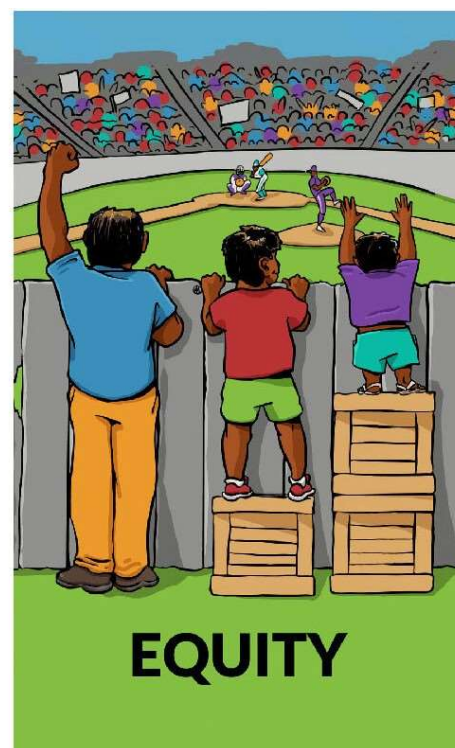
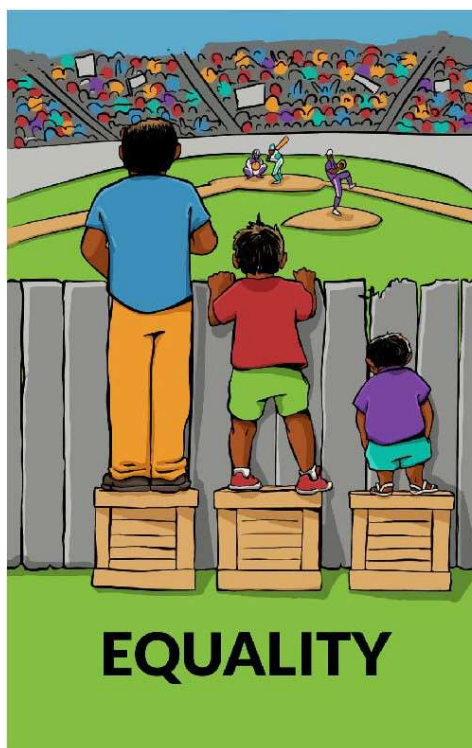
- The hybrid PPP method that has already been established institutionally needs to be activated.
 - The PPP Project Deliberation Committee held in January 2020 approved a plan to introduce a hybrid (BTO + BTL) PPP method, which was proposed in 2013.
 - A hybrid PPP project, based on the BTL method, must request a limit to the budget authority and obtain approval from the National Assembly, which takes more than a fiscal year.
 - When pursuing a hybrid project to respond to climate change, it is worth considering applying a fast-track process for National Assembly approval.

II. Allocation: Climate Change Vulnerability

- When deciding to pursue a PPP project, a comprehensive evaluation is made considering both **efficiency** and **equity**.
 - While the economic efficiency through the cost-benefit analysis (CBA) is emphasized, the inter-regional equity with respect to the balanced regional development (BRD) is also significantly considered.
 - The BRD has been a long-standing national policy agenda as the population has been concentrated in the Seoul metropolitan area due to rapid industrialization.
 - Under the unified public investment management (PIM) system, the evaluation scheme is identical for both conventional government procurement and PPP projects.

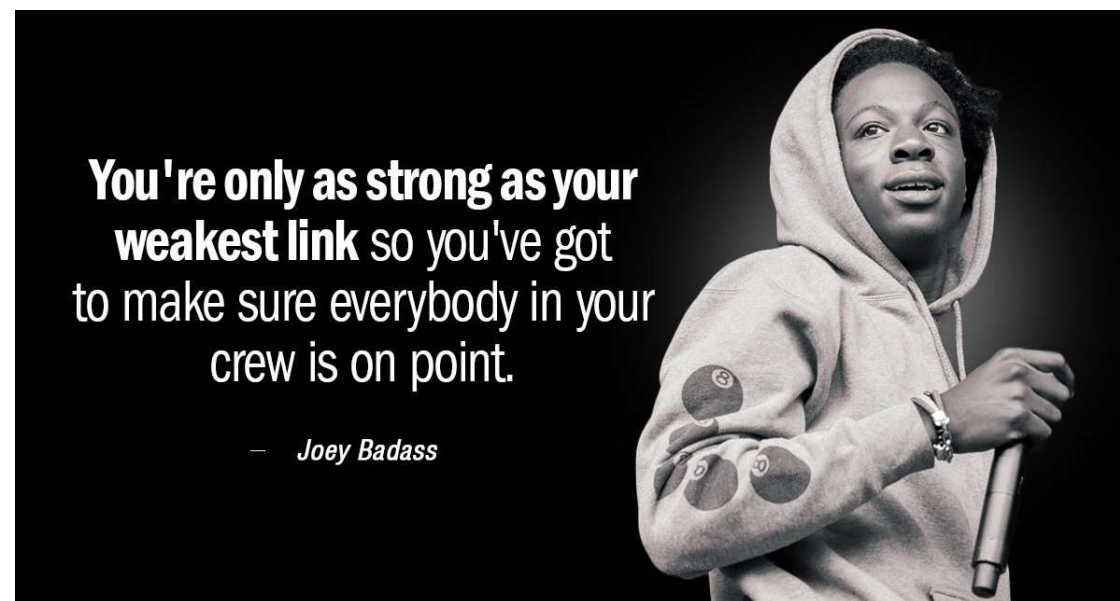
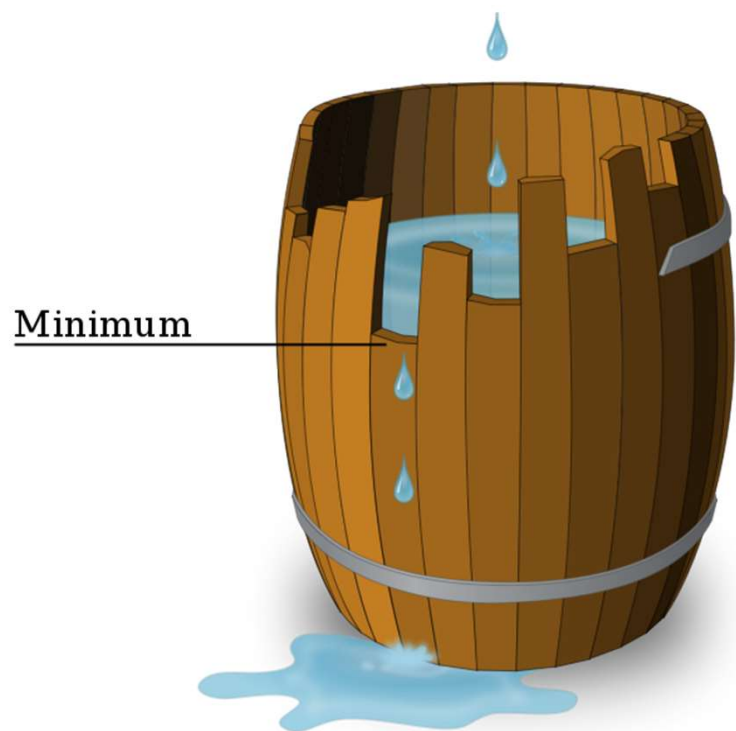
II. Allocation: Climate Change Vulnerability

- Inter-regional equity concerns may encompass the adaptation to climate change.
 - (Trade-off) Current BRD concerns aim to compensate for the disadvantages in the CBA of underdeveloped areas.



II. Allocation: Climate Change Vulnerability

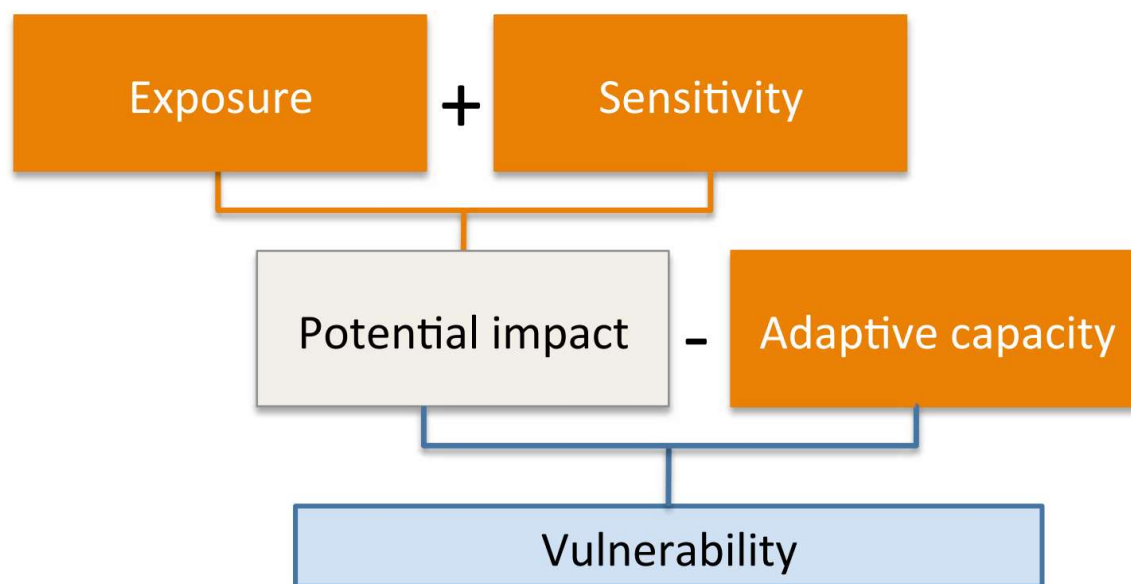
- Inter-regional equity concerns may encompass the adaptation to climate change.
 - (Law of the minimum) Loss can be minimized by maximizing the minimum.



II. Allocation: Climate Change Vulnerability

- Regional net zero vulnerability index can be calculated.

IPCC-derived conceptual model of vulnerability

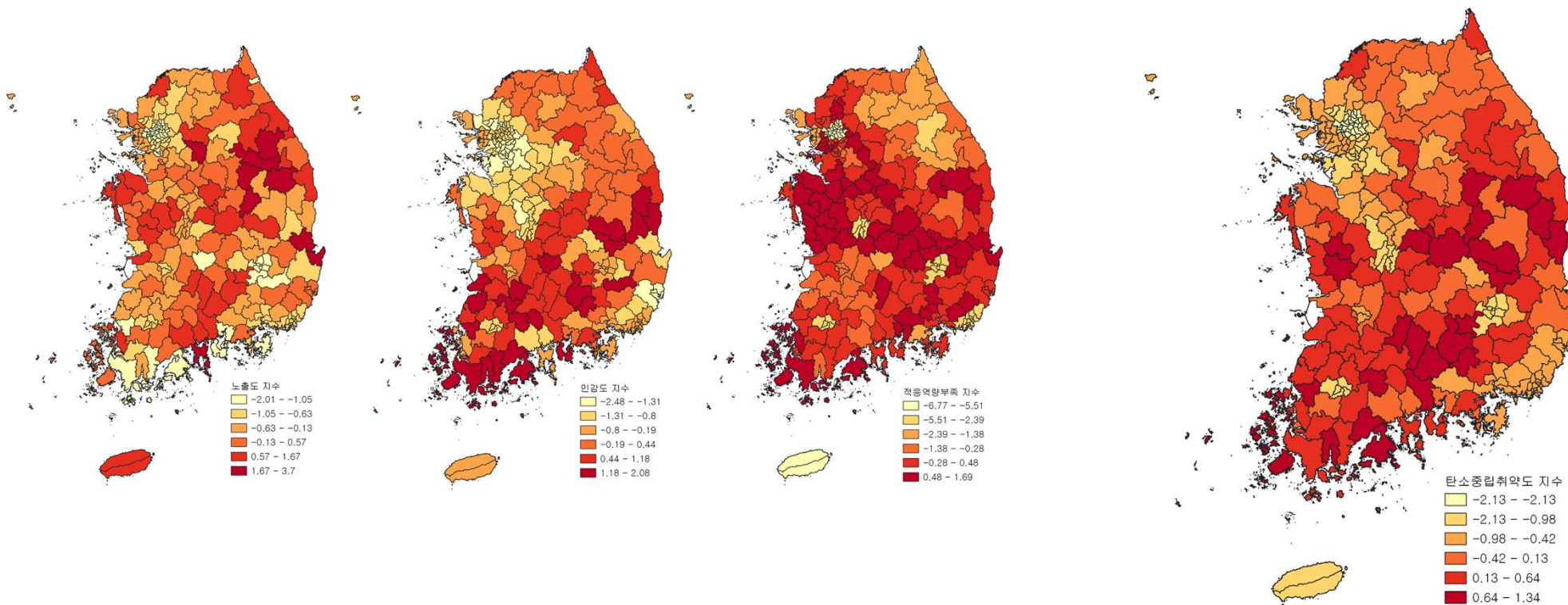


Sources: Kim (2022, KDI Research Monograph), in which the author adopted by many studies in which measure climate-related vulnerability including Carley *et al.* (2018, Nature Energy)

II. Allocation: Climate Change Vulnerability

Regional net zero vulnerability index

$$\text{Exposure} + \text{Sensitivity} - (\text{Adaptive Capacity}) = \text{Net zero vulnerability}$$

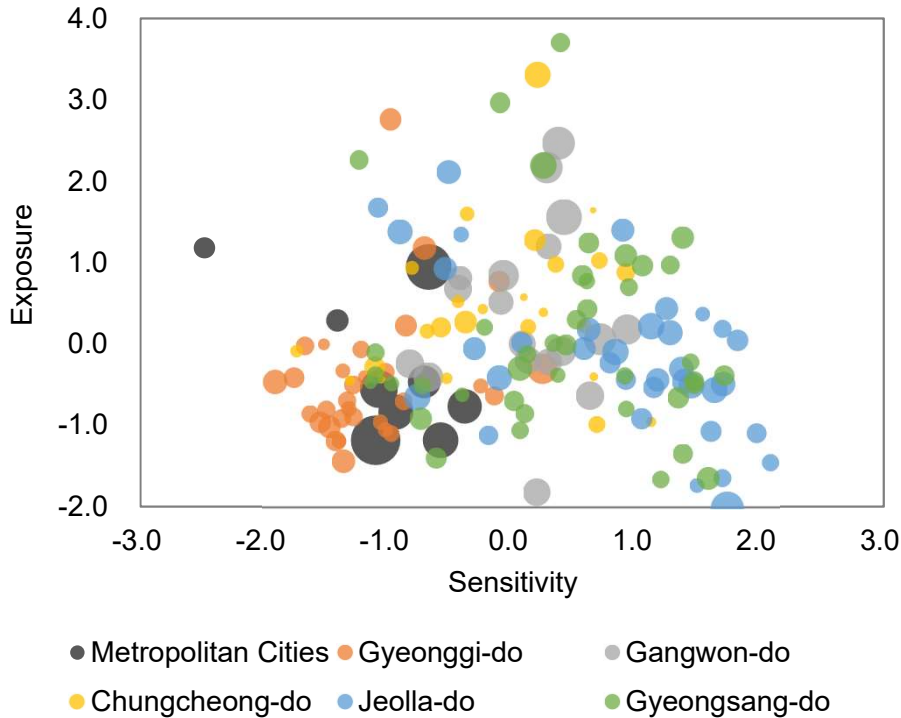


Sources: Kim (2022, KDI Research Monograph)

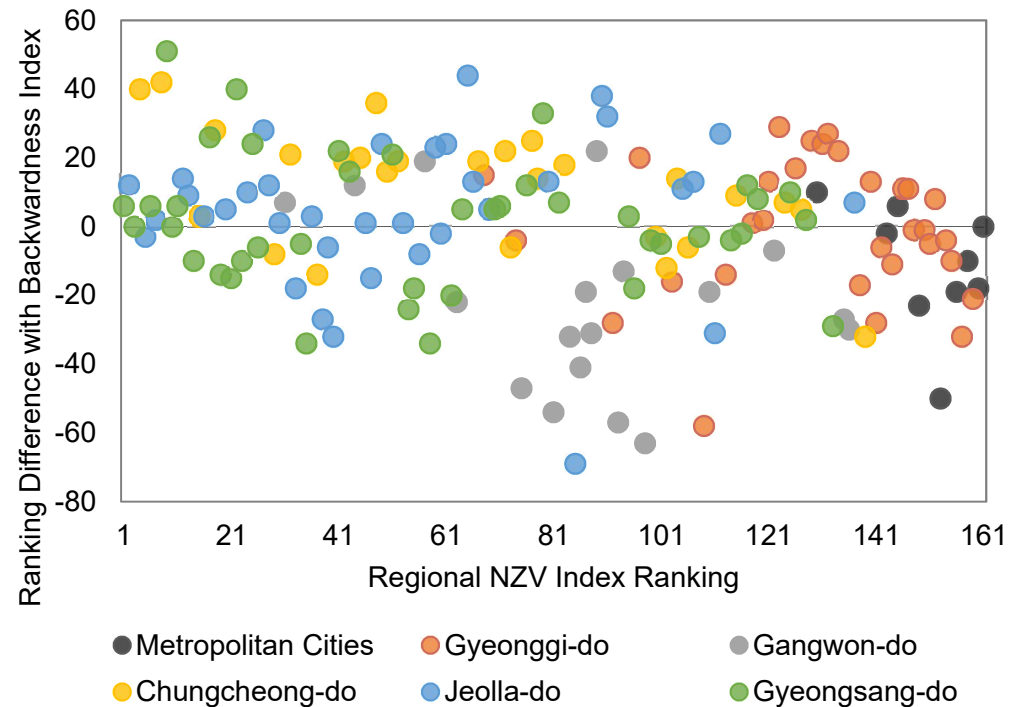
II. Allocation: Climate Change Vulnerability

Regional net zero vulnerability (NZV) index

Distribution of Adaptive Capacity



“Ranking of Regional Backwardness – Ranking of NZV”



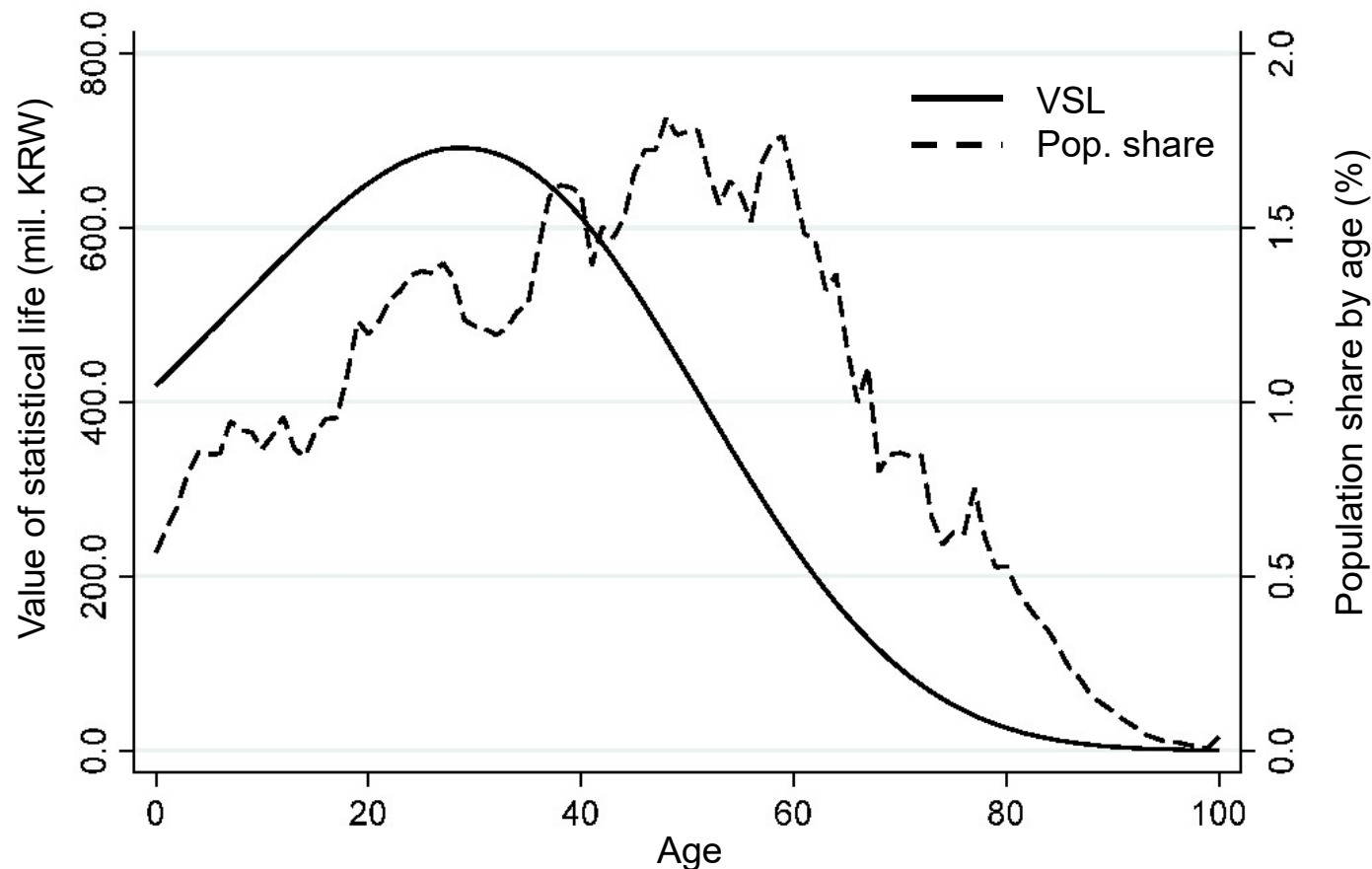
Sources: Kim (2022, KDI Research Monograph)

III. Benefit Estimation: Value of Lives

- When more extreme weather events are expected due to climate change, estimating benefits of reducing loss of life becomes more important.
 - In addition, rapid changes in population structure due to ultra-low birth rate and aging must be taken into consideration.
 - Although the methods of estimating benefits of reducing life losses may differ depending on the type of infrastructure, logical consistency and compatibility of estimates should be ensured.

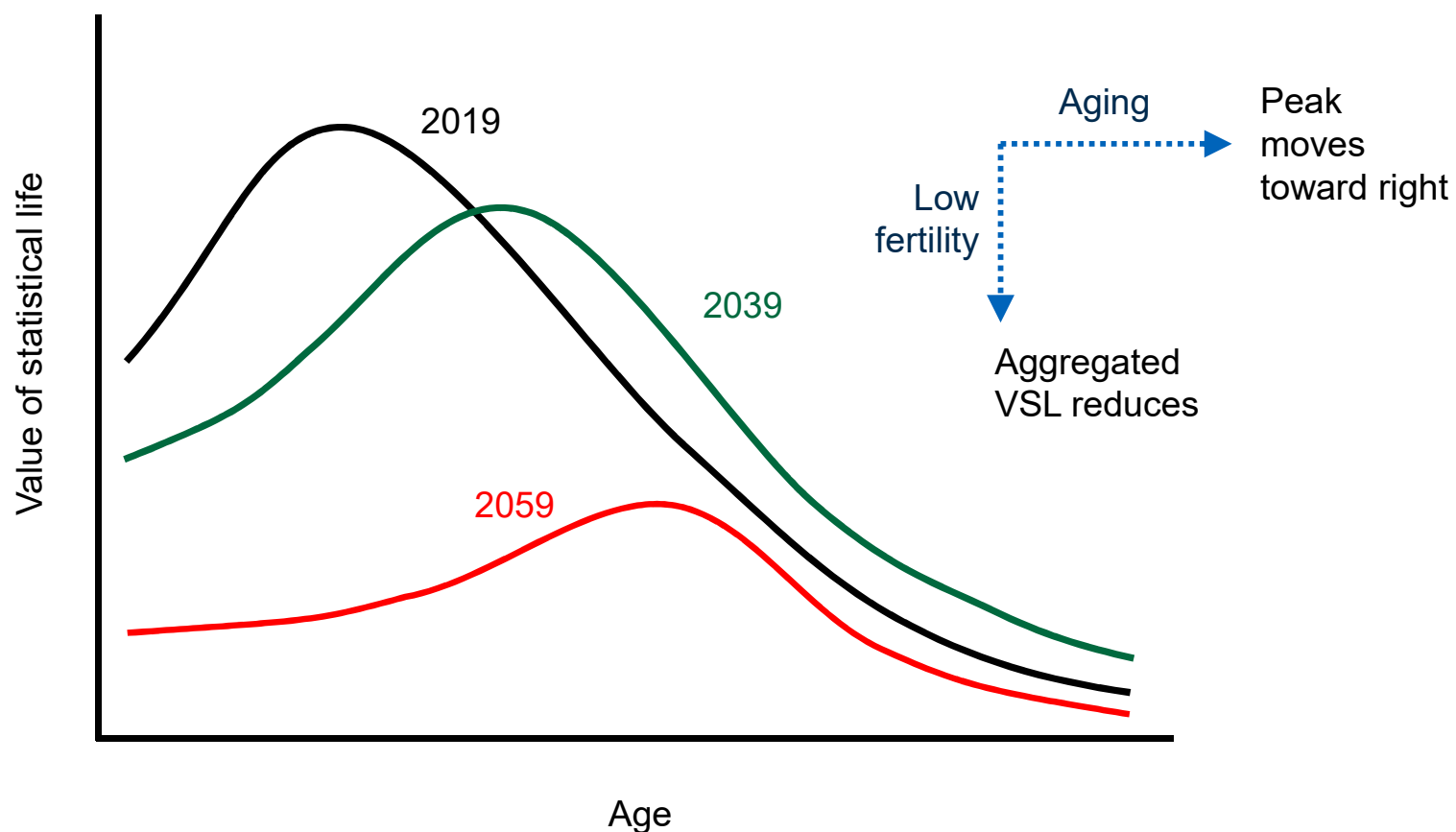
III. Benefit Estimation: Value of Lives

- Value of statistical life (VSL) used for benefit estimation of medical institutions



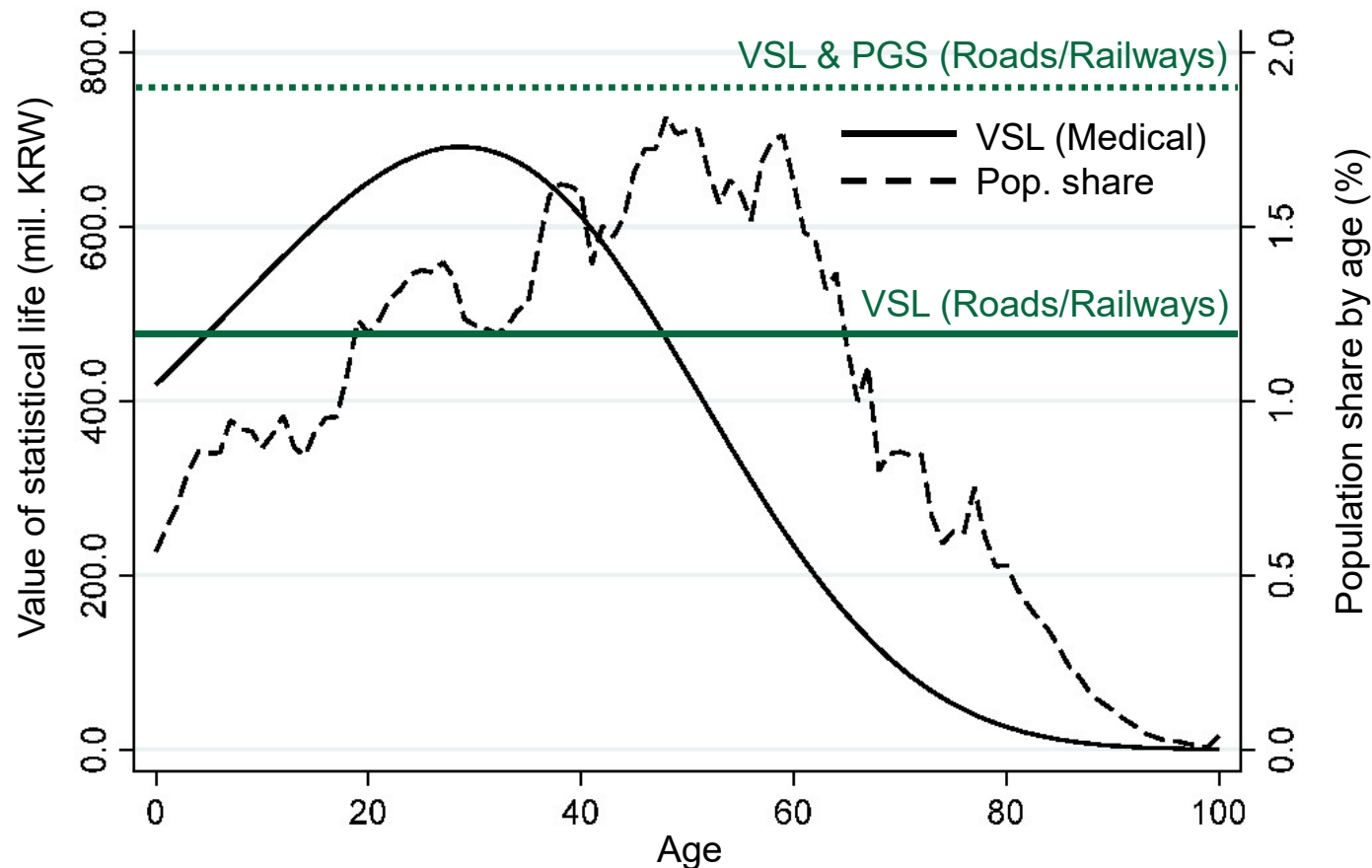
III. Benefit Estimation: Value of Lives

- Rapid change in population structure will reshape the aggregated VSL.



III. Benefit Estimation: Value of Lives

- Compatibility of estimated benefits
 - Medical institutions vs. Roads/Railways



Summary

- Promoting hybrid methods
 - Responses to climate change may increase costs and worsen profitability.
- Allocating projects regionally to confront climate change
 - Include resolution of vulnerability to climate change as one of the policy goals.
- Improving evaluation methodology in line with climate change response
 - Benefits from responses to climate change must be fully evaluated.

Thank you .

감사합니다

