Small Area Estimation of Underemployment in the Bicol Region Using Model-Based Approach

Presented by

Driesch Lucien R. Cortel

Philippine Statistics Authority

By

Mechelle M. Viernes and Driesch Lucien R. Cortel

Philippine Statistics Authority

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

OUTLINE OF THE PRESENTATION

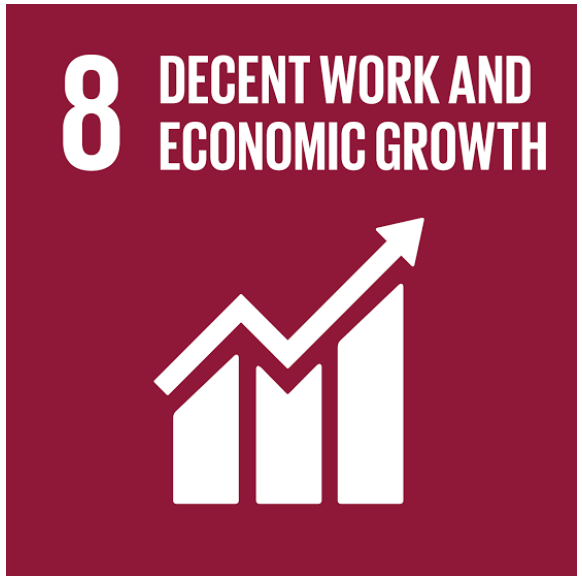
WHY MEASURE UNDEREMPLOYMENT?

GENERATING SAE OF UNDEREMPLOYMENT

WHAT DID WE FIND OUT?

WHAT DID WE LEARN?

WHY MEASURE UNDEREMPLOYMENT?



- To achieve the Sustainable Development Goals…

  Goal 8 – Decent Work and Economic Growth that promotes sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Huge Inequality Among

Income Levels

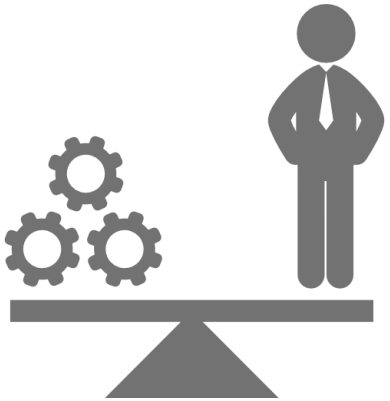
Weak

Employment Generation

Unmanaged

Population Growth

WHY MEASURE UNDEREMPLOYMENT?



- **Underemployment** is a measure of labor underutilization to complement unemployment rate in signaling situations of insufficient labor absorption among persons in employment with unmet need for work for pay or profit.

- At present, the **Philippine Statistics Authority (PSA)** has been producing national and regional level official employment indicators such as employment rate, unemployment rate and underemployment rate.

WHY MEASURE UNDEREMPLOYMENT?

Problem

A **growing demand** from the local government to have city and municipal estimates

Solution

Use of **small area estimation (SAE)** at the municipal and city level

Action

Regular generation of small area statistics and **adoption** of an improved **official SAE methodology**

GENERATING SAE OF UNDEREMPLOYMENT

- The main idea of SAE is to **merge information** from different types of data sources to come up with small area estimates.

1 Direct Estimation

Using the **2015 Labor Force Survey**, generate Direct Estimates of the Underemployment Rate

2 Spatial Autocorrelation

Generation of **Moran's I estimate** to determine spatial autocorrelation

3 Model-based SAE

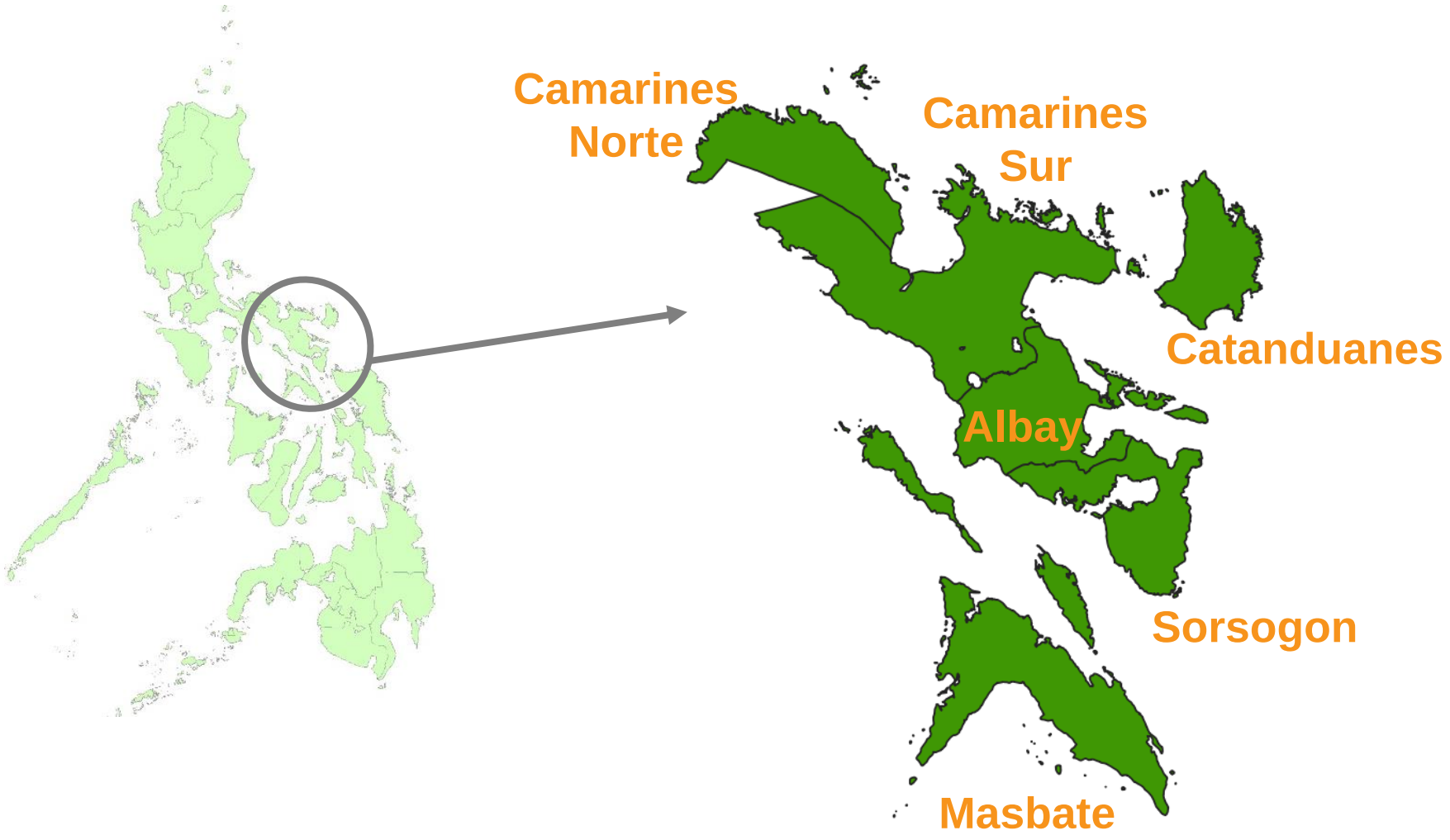
Determine the appropriate SAE model-based estimation methodology for underemployment

4 Model Based Approach (EBLUP)

2015 Labor Force Survey + **2015 Census of Population** + **Geo-Spatial Variables (RAI, NTL, Distance to Town Capitol)** → **PREDICTORS** Time Invariant and Averages at the Municipal Level Variables

Generation of the 2015 City and Municipal Level Underemployment Rate based on SAE

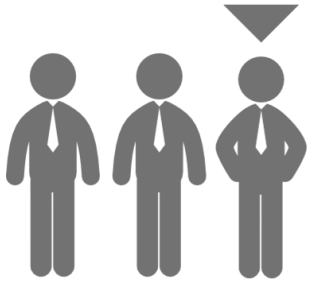
WHAT DID WE FIND OUT?



Bicol has…

- **6** Provinces
- **7** Cities
- **107** Municipalities

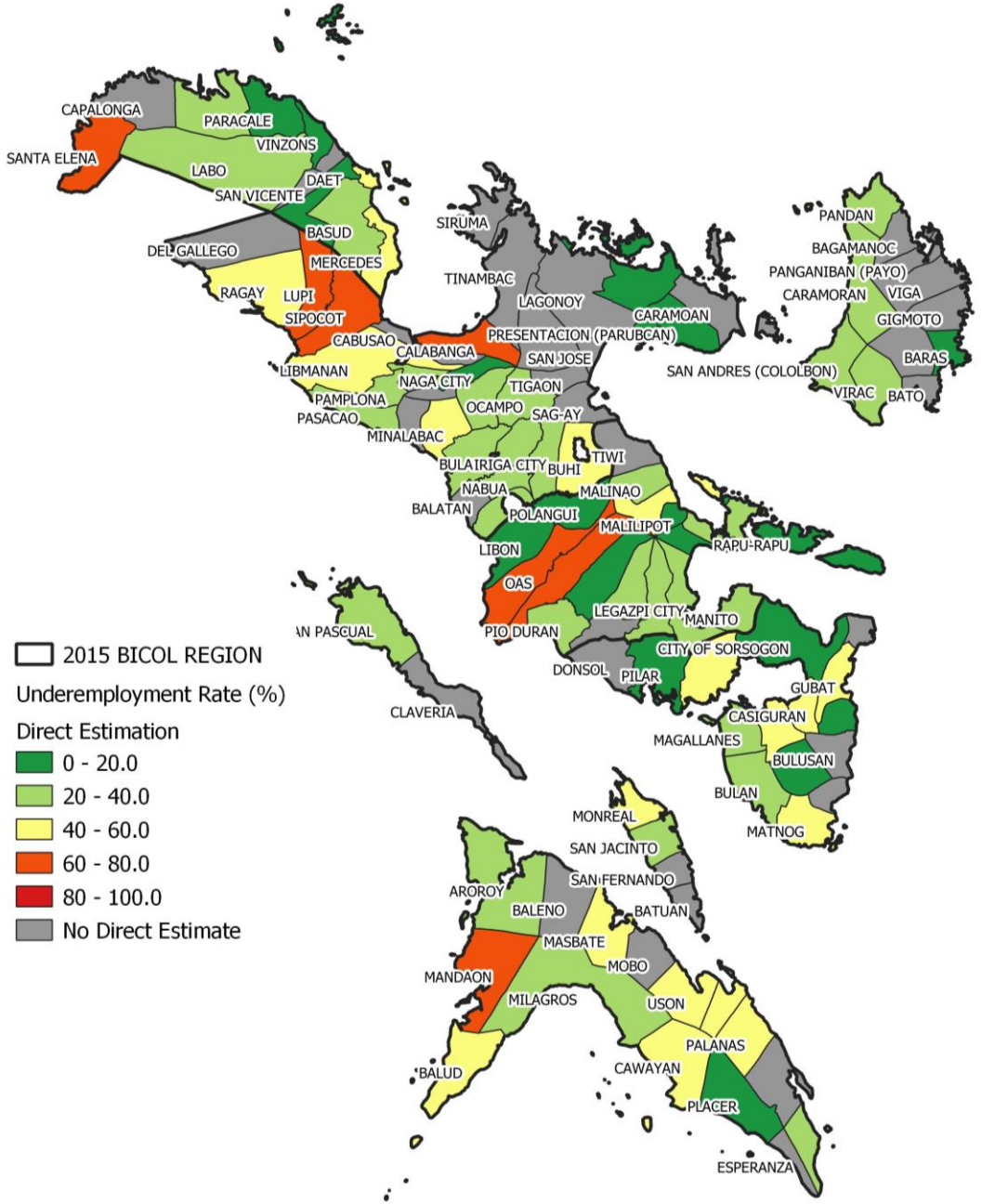
- **Bicol** has one of the highest incidences of underemployment across the regions
- **One in every three** individuals of the labor force in Bicol was underemployed in 2015.



WHAT DID WE FIND OUT?

2015 Underemployment Rate Using Direct Estimation

- **77 estimates** were generated out of the 114 cities and municipalities of Bicol
- **41% of the municipalities and cities** had estimates ranging from 20% to 40%
- Municipalities and City with underemployment rate that were greater than 60%: **Calabanga, Mandaon, Lupi, Sipocot, Santa Elena, Oas** and **Ligao City**



WHAT DID WE FIND OUT?

Spatial Autocorrelation of Underemployment Rate in Bicol Region

Moran's I

-0.028

The spatial correlation is negative, implying that there is dissimilar underemployment rate among the municipalities that cluster together.

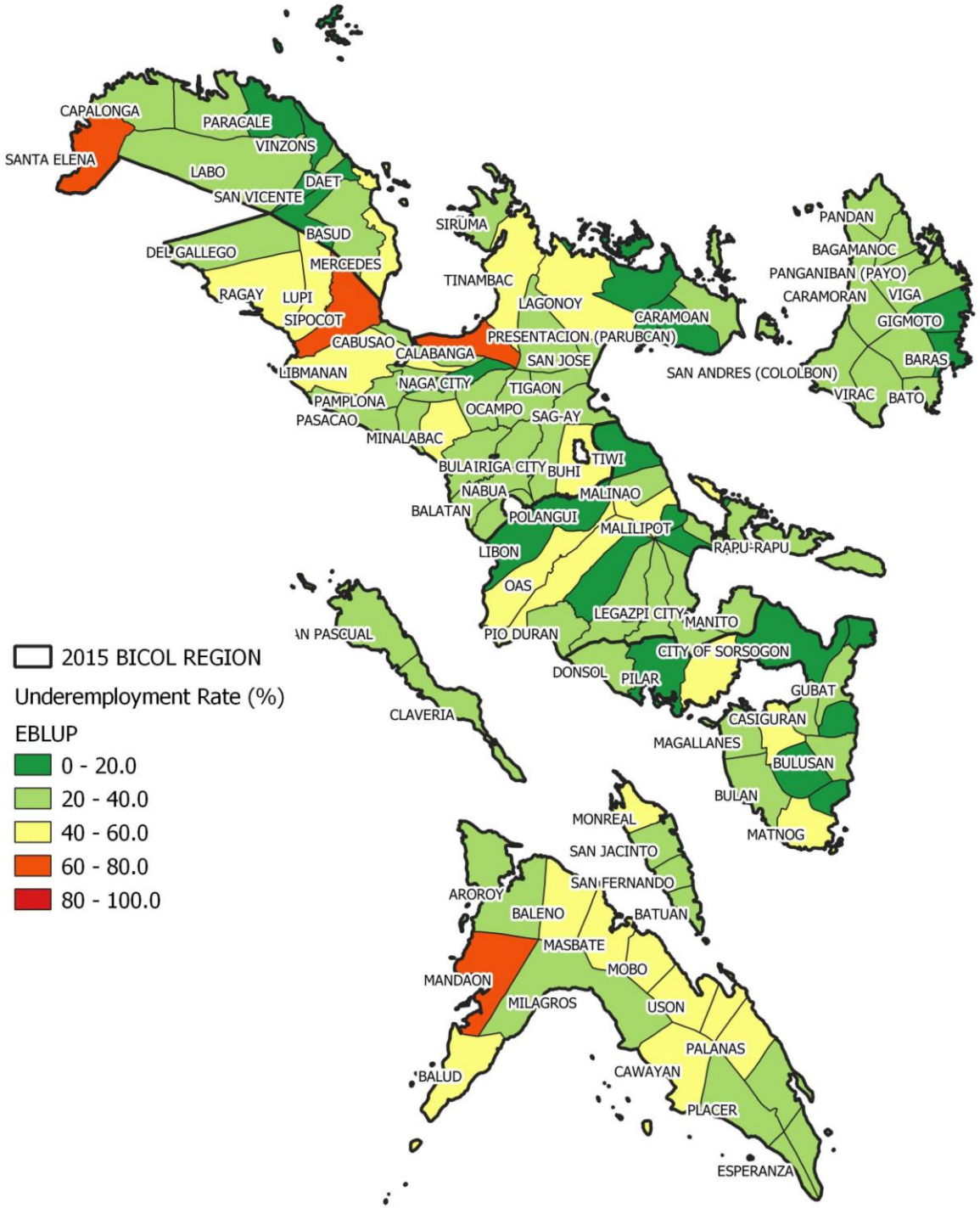
Using the EBLUP estimation in predicting the underemployment rate, there were five predictors in the model with an Adjusted-R^2 of 31.53%.

- average number of **laborers and unskilled workers** in the municipality/city (-)
- average number of barangays with a **library** in the municipality/city (-)
- average number of barangays where a **town/city hall or provincial capitol** is located (-)
- average number of barangays in the municipality/city **with a large or significant number of families who moved to the barangay in the last five years** (+)
- average number of barangays with **establishment(s) offering personal services** (+)

WHAT DID WE FIND OUT?

2015 Underemployment Rate Using EBLUP Estimation

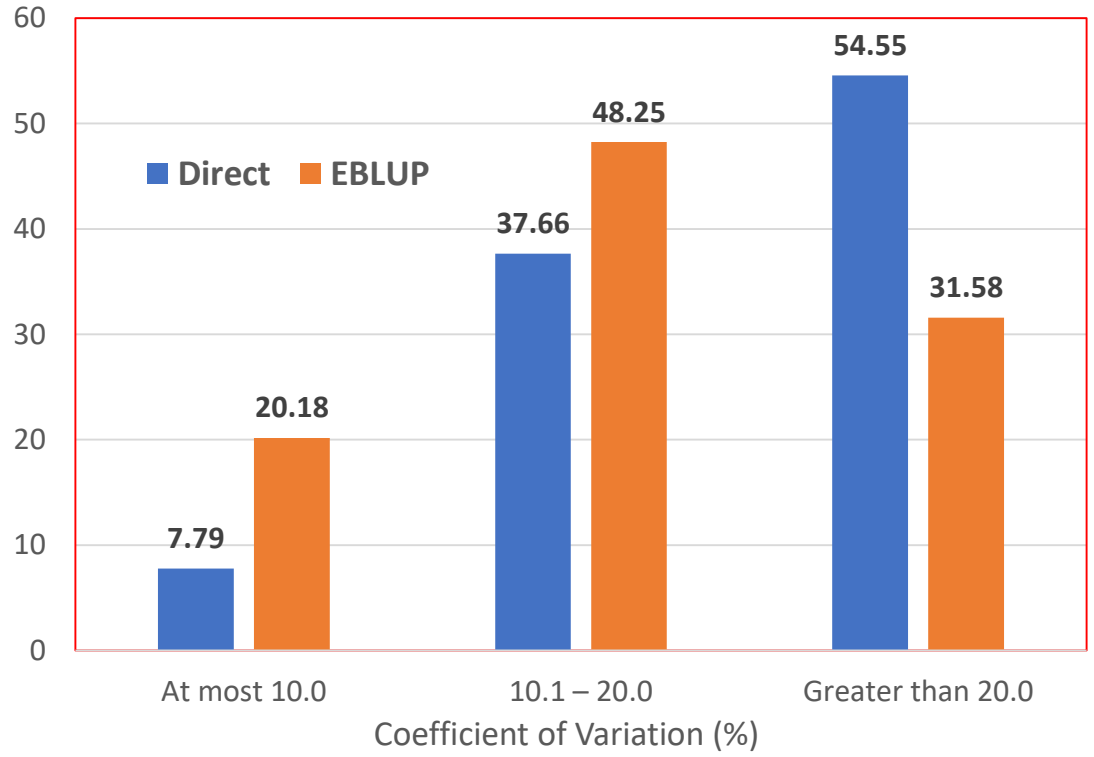
- **114 estimates** were generated for the 114 cities and municipalities of Bicol
- **55.3% of the municipalities and cities** had estimates ranging from 20% to 40%
- Municipalities and City with underemployment rate that were greater than 60%: **Calabanga, Mandaon, Sipocot** and **Santa Elena**



WHAT DID WE FIND OUT?

- The number of reliable and acceptable estimates **increased from 35 to 78** out of the 114 after generating **EBLUP estimates**
- **54.55% of the coefficients of variation** obtained from **direct estimation** were greater than 20% implying that the estimates obtained were **mostly unreliable**
- **68.43% of the coefficients of variation** obtained from the **EBLUP** were less than 20% implying that the estimates obtained were **mostly reliable**

Coefficient of Variation of the Estimates obtained using Direct Estimation and EBLUP Estimation



Coefficient of Variation	Direct Estimation		EBLUP Estimation	
	Frequency	Percentage	Frequency	Percentage
At most 10.0	6	7.79	23	20.18
10.1 – 20.0	29	37.66	55	48.25
Greater than 20.0	42	54.55	36	31.58
Total	77	100	114	100

WHAT DID WE LEARN?

- **Direct estimation and Model-based estimation (EBLUP)** were utilized to estimate the municipal and city level underemployment rate in the Bicol Region using 2015 LFS, PopCen, BL and geo-spatial variables (NTL, RAI and distance to town capitol).

- **Almost 70%** (around 78 out of 114) of the generated municipal and city level estimates have **acceptable measures of reliability**.

- **Underemployment is not spatially affected** by its neighbors which was concluded from computing the Moran's I estimate.

- It was discovered that the generated models using ELL have no predicting power in generating underemployment estimates since the average of the generated Adjusted R-squares was below 10%.

- Further studies may be done to identify strong correlates of underemployment.

Thank you!