PAMBANSANG PANGASIWAAN SA KABUHAYAN AT PAGPAPAUNLAD
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UNDP

A Decade of Collaboration:

Charting the Path Forward through Partnerships in M&E

THE 10th M&E NETWORK FORUM

29 November 2023 | Seda Vertis North, Quezon City

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Impact Evaluation of the Arterial Road Bypass Project, Phase II

A study by NEDA RO3 and Bulacan State University

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PRESENTATION OUTLINE

1. Project Information
2. Project Location Map
3. Theory of Change
4. Evaluation Objective and Question
5. Traffic congestion and its covariates
6. Methodology
7. Determining the counterfactuals
   - -Data Collection
   - -Data Analysis
8. Preliminary Results
   - -Pre-intervention trends
   - -SCM
9. Conclusion
10. Ways Forward

Project Information

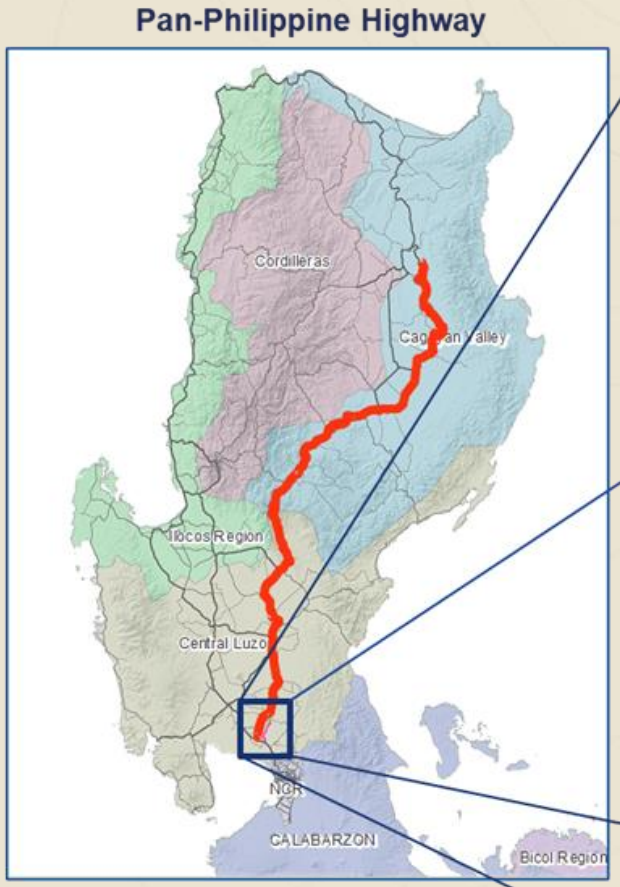
Evaluation Title: Impact Evaluation of the Arterial Road Bypass Project, Phase II

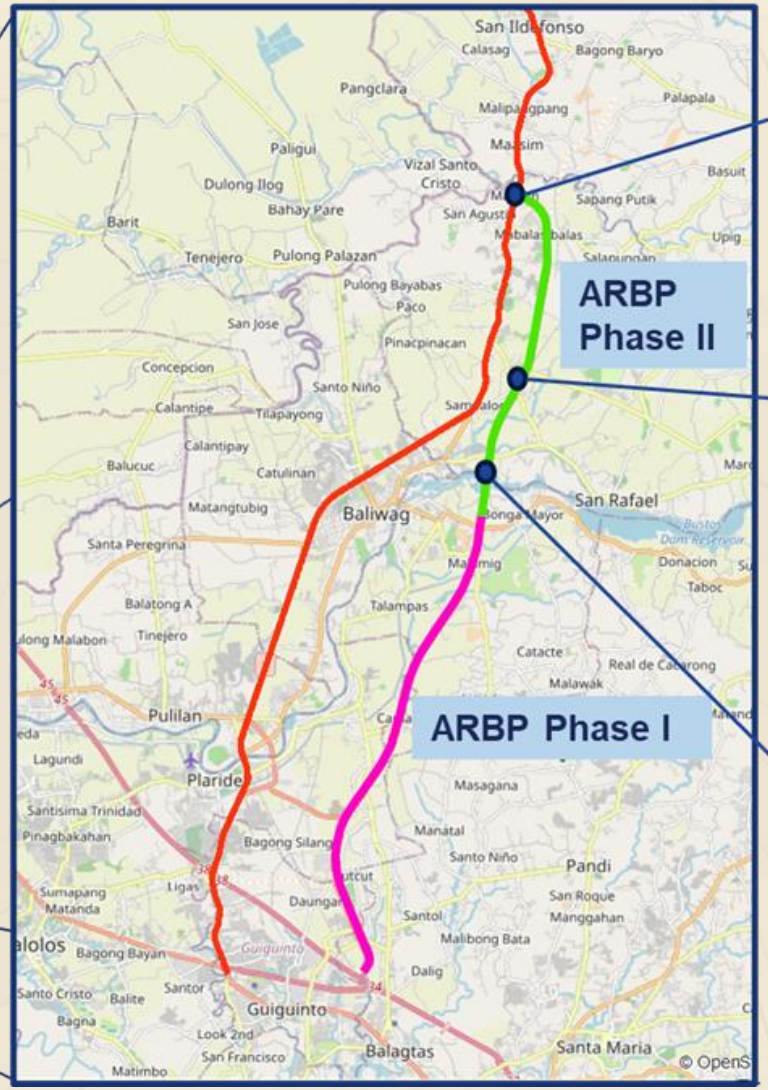
Purpose of the Project: Decongest traffic at the Pan Philippine Highway

Implementing Agency: DPWH

Evaluators: NEDA Regional Office III and Bulacan State University

Project Location Map





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Theory of Change

SITUATION YOU WANT TO CHANGE	INTERVENTIONS (RESOURCES)	INTERVENTIONS (ACTIVITIES)	MEASURABLE INDICATORS	MEASURABLE EFFECTS	PRECONDITIONS TO GOALS	LONG TERM GOALS
Traffic congestion at the core urban areas along the Pan-Philippine Highway	Funding of PHP1.75 billion through a loan from JICA DPWH as the lead implementing agency Capacity of workers / contractors of the bypass road	Phase II: Construction of a total length of 9.96 km bypass road which includes 1.12 km bridge spanning the Angat River	Annual average daily traffic (AADT) at the Pan-Philippine Highway reduced	Decongest traffic in urban areas along the Pan-Philippine Highway.	Increased economic activity which caused traffic congestion in core urban areas	Seamless and inclusive connectivity achieved

Evaluation Objective and Question

- **Objective**: Evaluate the impact of ARBP II in reducing traffic congestion at the Pan-Philippine Highway
- **Evaluation Question**: Did the Arterial Road Bypass Project Phase II decongest traffic at the Pan Philippine Highway?

Methodology

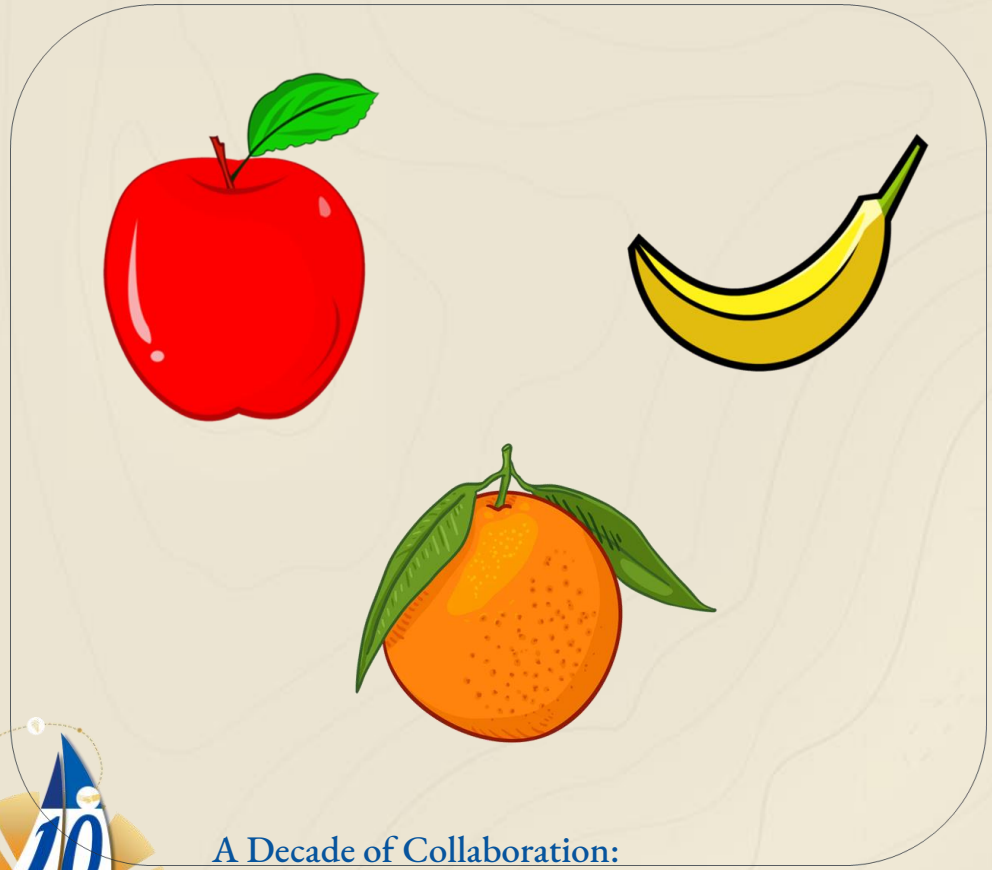
- The **synthetic control method (SCM) was used to evaluate the impact of an intervention in comparative case studies**
  - Comparative case studies concern only one/few treated units and many control units
  - **Regression-based techniques cannot apply to comparative cases due to limited sample size**
  - SCM formalizes the selection of the comparison units using a data driven-procedure

Methodology

- **SCM statistically constructs the counterfactual, which is a weighted average of control units (i.e. donor pool)**
- SCM algorithmically constructs the comparison group based on:
  - Pre-intervention trends on the outcome
  - Pre-intervention predictors of the outcome

Methodology

Donor Pool (control units)



Synthetic Counterfactual

Methodology

VS

Synthetic Counterfactual

Treatment Unit

Traffic congestion and its covariates

- Traffic congestion - Annual Average Daily Traffic
- Total population and Population density
- Poverty incidence
- LGU Income
- LGU Spending
- Number of vehicles*

**not available at DPWH DEO or city/mun. level (unit of analysis)*

Data Collection (Ideal vs Actual Dataset)

Ideal Dataset

- ★ 20 years pre-intervention period
- ★ complete
- ★ available data at the DEO level
- ★ covariates should be directly related to traffic

Actual / Available Dataset

- ★ 2013-2018 pre-intervention period
- ★ missing 2014 data
- ★ data available at the municipal level
- ★ covariates data readily available are from PSA and BLGF

Determining the Counterfactuals

DEOs will be included in the donor pool provided they are:

- In Region 2 or Region 3
- Along the Pan-Philippine Highway
- Do not have existing bypass roads
- Not covered by any ARBP alignment

Bulacan DEO 1 served as the treatment unit. Meanwhile, 8 DEOs were included in the donor pool:

Province	No. of DEOs	No. of LGUs
Bulacan	2	8
Nueva Ecija	2	10
Nueva Vizcaya	2	9
Isabela	3	13
Cagayan	1	1
Total	**10**	**41**

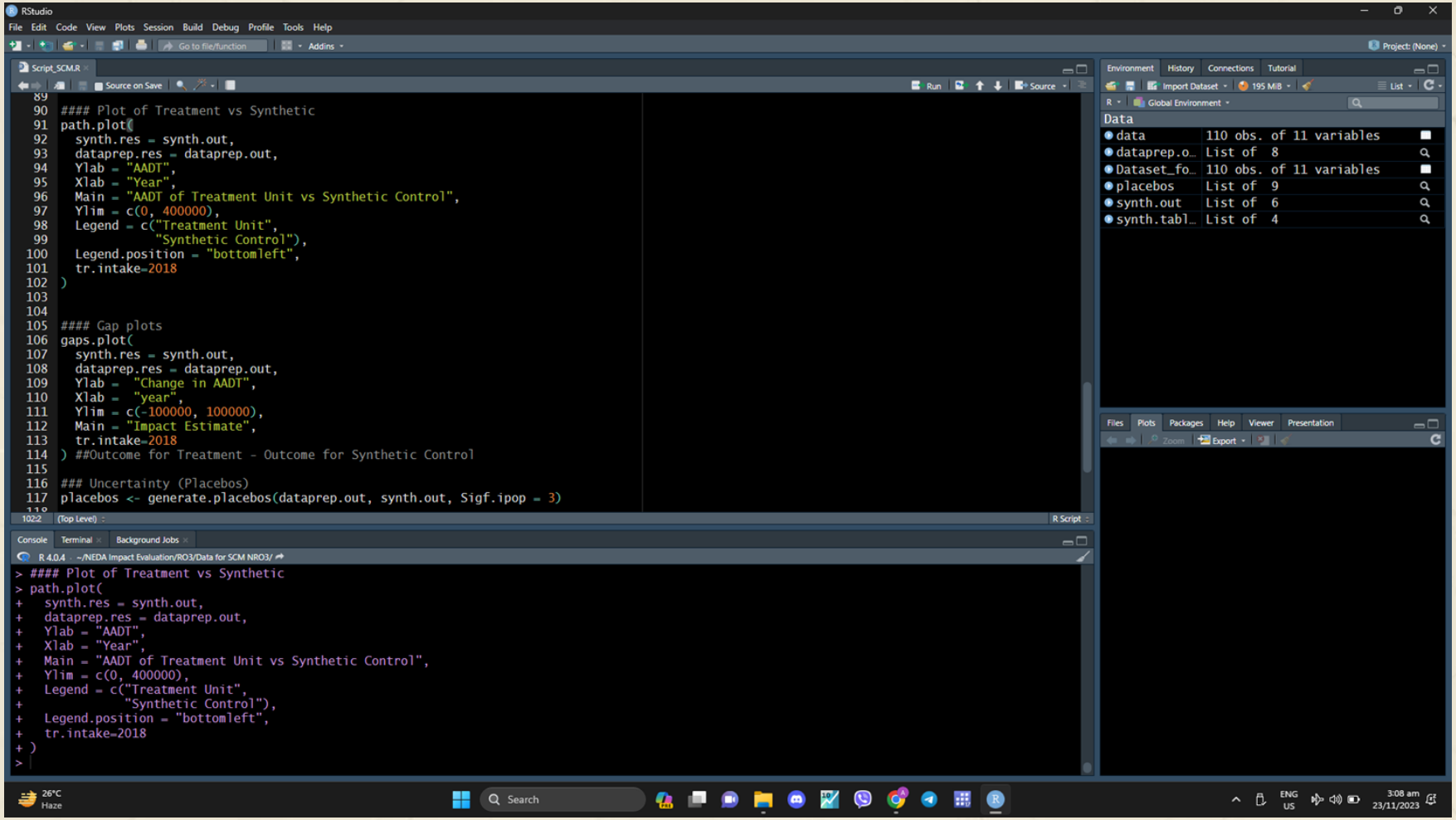
Data Collection

DEOname	Province	DEOnumber		Treatment Status	Year	AADT	Pop	PopDen	Revenues	Disbursements	Poverty
1Bulacan	Bulacan	1		T	2012				984.60	809.53	5.27
1Bulacan	Bulacan	1		T	2013	69,182			1,086.41	925.11	
1Bulacan	Bulacan	1		T	2014				1,244.29	888.32	
1Bulacan	Bulacan	1		T	2015	159,661	521,851	2,914.33	1,389.27	1,012.92	6.01
1Bulacan	Bulacan	1		T	2016	162,928			1,544.55	1,220.53	
1Bulacan	Bulacan	1		T	2017	149,689			1,772.78	1,367.92	
1Bulacan	Bulacan	1		T	2018	168,280			1,960.28	1,575.64	4.48
1Bulacan	Bulacan	1		T	2019	15,812			2,246.63	1,810.74	
1Bulacan	Bulacan	1		T	2020		582,352	3,234.23	2,490.04	2,062.94	
1Bulacan	Bulacan	1		T	2021				2,555.10	2,075.12	
1Bulacan	Bulacan	1		T	2022						

The following were aggregated at the level of DEOs to construct the panel data:

1. AADT : DPWH administrative data for 2013, 2015 to 2019
2. Population and Population Density : PSA Census for 2015 and 2020
3. Revenues and Disbursements: LGU Statement of Receipts and Expenditures from BLGF
4. Poverty: Small Area Estimates for 2012, 2015, and 2018

Data Analysis – Rstudio software



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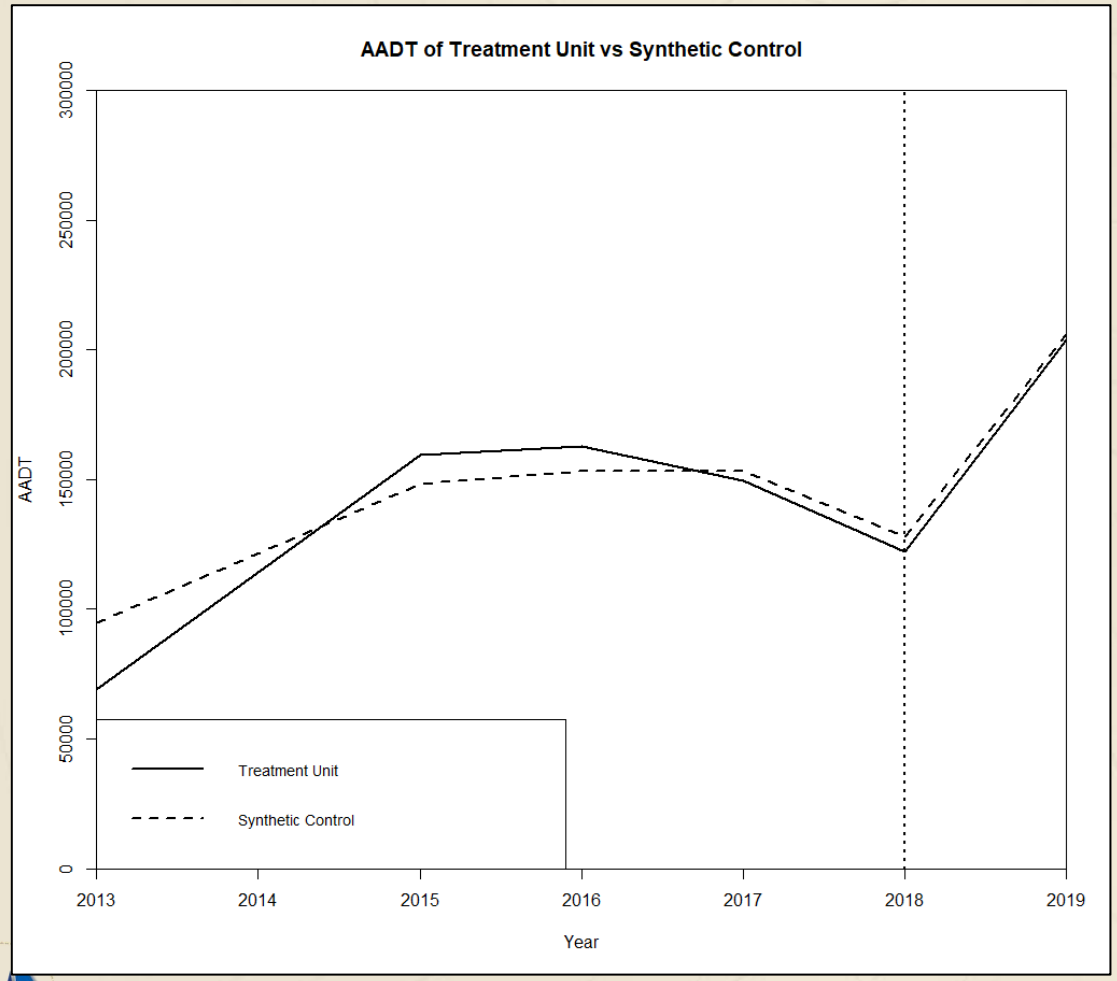
Data Analysis – Synthetic Control

Weights	Unit Names
0.055	Nueva Ecija DEO 1
0.890	Nueva Ecija DEO 2
0.000	Nueva Vizcaya DEO 1
0.000	Nueva Vizcaya DEO 2
0.000	Isabela DEO 1
0.000	Isabela DEO 3
0.000	Isabela DEO 4
0.056	Cagayan DEO 3

Preliminary Results

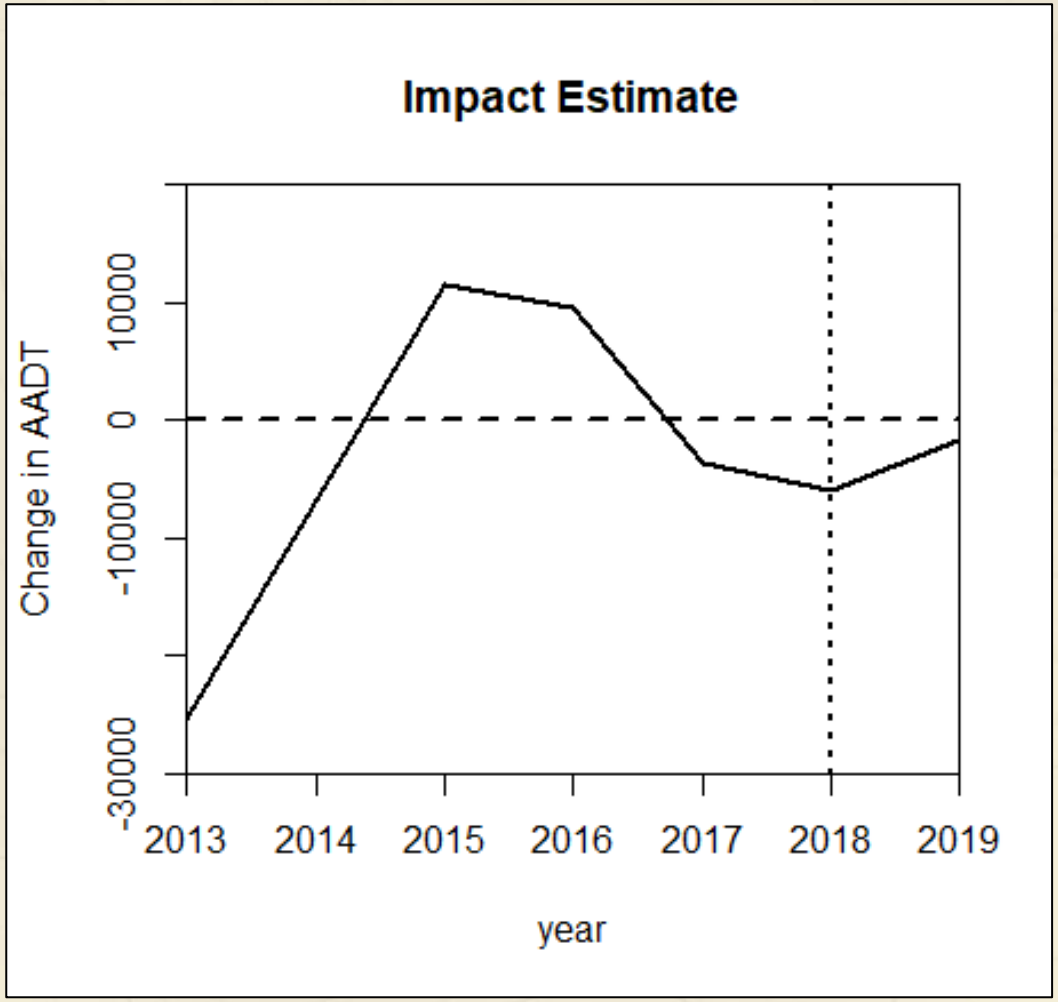


Interpretation of Results:

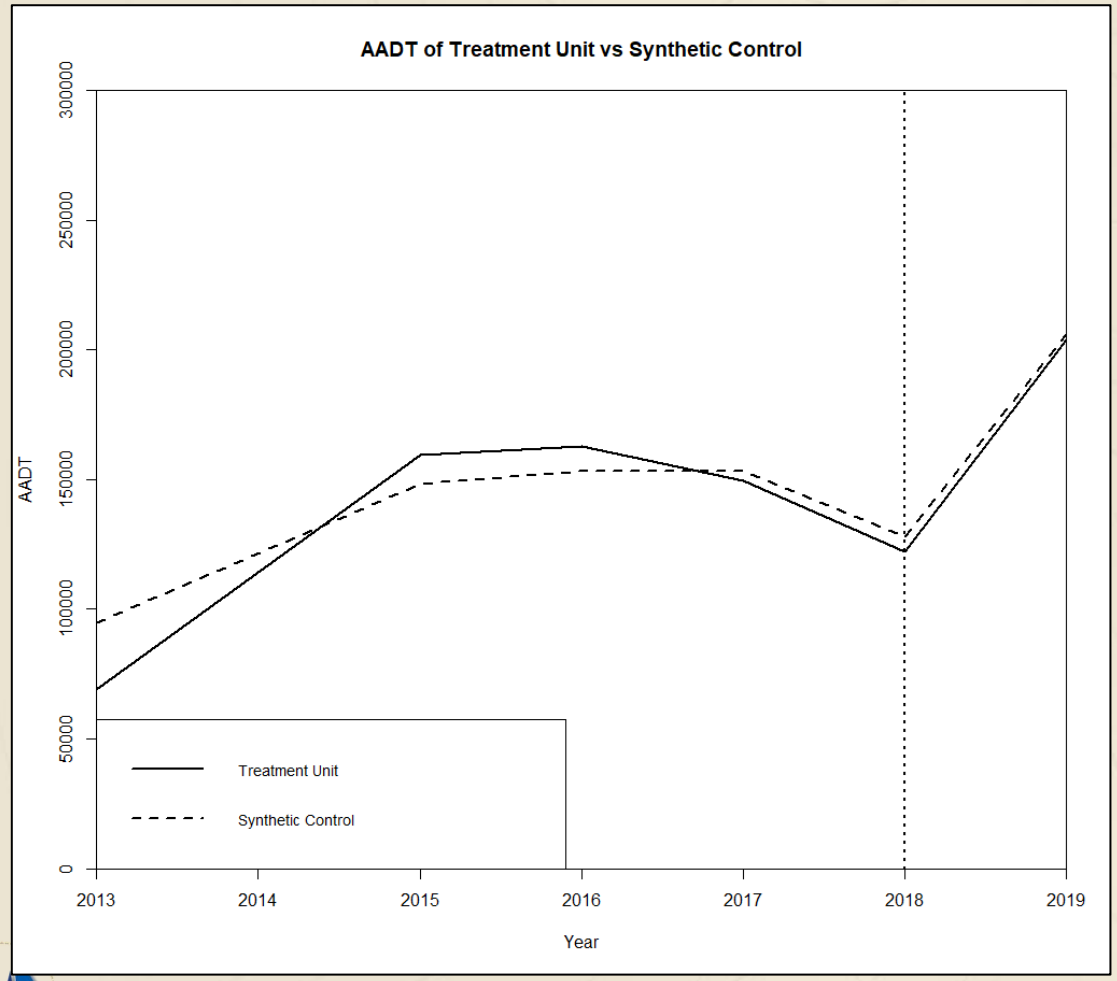
- Post-intervention, **AADT of the treatment unit is lower versus the synthetic control**
- **Traffic congestion would have been worse** in the Pan-Philippine highway **without the intervention**
- *Caveat: Synthetic control fit may still improve with a longer pre-intervention horizon*

Preliminary Results

- The gap in AADT between treatment and synthetic control, post-2018, **is below 0**.
- The Bypass Road reduced AADT in the Pan-Philippine highway by **1,857 vehicles**



Conclusion



Evaluation Question:

Did the ARBP Phase II decongest traffic at the Pan Philippine Highway?

Answer:

Yes

Ways Forward

Areas	Primary Considerations	Challenges	Action Steps
Data Analysis	SCM bias bound is inversely related to time (Abadie, 2021) Longer pre-intervention horizon = better synthetic control	Pre-intervention data is only available from 2013 to 2018 (2014 is missing)	Request longer term AADT data from the DPWH Consider broadening the scope after completion of ARBP3 to estimate impact of ARBP in its entirety (Phases I to III)
	Having covariates strongly linked to the outcome variable will produce a better synthetic control	Some covariates related to traffic congestion (e.g., car registration data) are not readily available	Request administrative data from the LTO or municipal LGUs

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