An Assessment of

Impact of Institutional Capacity,

Educational Outcomes and Political Leadership in the Economic Growth of Municipalities of Nepal

**Primary Researcher:** Aashish Panta ’26, Swarthmore College  
**Research Mentor:** Raj Kharel, Economic Geographer  
**Supported by:** Ella Foster-Molina ’07, PhD, Social Science Quantitative Laboratory Associate, Swarthmore College

Table of Contents

[Abstract 1](#_Toc171496601)

[Introduction of Federalism in Nepal 2](#_Toc171496602)

[Quantifying Economic Growth 2](#_Toc171496603)

[Institutional Capacity 6](#_Toc171496604)

[Educational Outcome 9](#_Toc171496605)

[Political Leadership 10](#_Toc171496606)

[Variables and Date Sources 11](#_Toc171496607)

[Regression Results 13](#_Toc171496608)

[Reflections 16](#_Toc171496609)

[Key Questions 17](#_Toc171496610)

[Sources 17](#_Toc171496611)

# Abstract

Rural and urban municipalities of Nepal have witnessed an upward trajectory in economic growth in the past few years manifested as infrastructural progress such as road expansions, power connectivity, educational and health facilities, and more. A robust understanding of the factors conducive to economic growth in municipalities can provide a policy roadmap for further strengthening such factors.

In my research, I am interested in empirically analyzing the impact of three key potential determinants of economic growth---institutional capacity, educational outcomes, and political leadership---from 2017 to 2021.

In an institutional capacity, I refer to the ability of municipalities to execute their responsibilities reflected through their day-to-day performance and overall accomplishments. I am curious whether stronger institutional capacity is related to better economic growth or not.

In terms of educational outcomes, I am focusing on the percentage of the population with a high school degree or above. Recent studies have empirically shown that higher educational attainment among the population yields higher economic growth[[1]](#footnote-1). I am eager to see if the conclusion holds true in the context of the municipalities of Nepal.

In the case of political leadership, I am specifically looking at quantifiable aspects of chairpersons of municipality---like their sex, age at election, and political affiliation. These three variables provide a foundation for analyzing the difference in the performance of male and female leaders, the impact of age on economic growth, and the performance of chairpersons belonging to the ruling party in the federal government.

# Introduction of Federalism in Nepal

* Nepal became a federal republic in 2015 after promulgation of a new constitution in 2015
* The tiers of governments under federalism are:
  + 1 federal government
  + 7 provincial governments
  + 753 local governments
    - 6 metropolitan cities
    - 11 sub-metropolitical cities
    - 276 municipalities
    - 460 rural municipalities
* Government tenures:
  + 1st election: September 2017
  + 2nd election: May 2022

# Quantifying Economic Growth

* Lack of data on GDP of local governments
* Nightlight data of Nepal used as a proxy for economic activities
* Nightlight data is an idea proxy for economic activities as well as human wellbeing for a developing country like Nepal as a large share of economy is in informal sector, which is not effectively captured by GDP[[2]](#footnote-2)
* In context of Nepal, researchers have used VIIRS night light data to estimate the impact of the 2015 earthquakes[[3]](#footnote-3)

A graph with a line and numbers

Description automatically generated

*Figure 1: Line graph of average night light per square kilometer from 2012 to 2023*

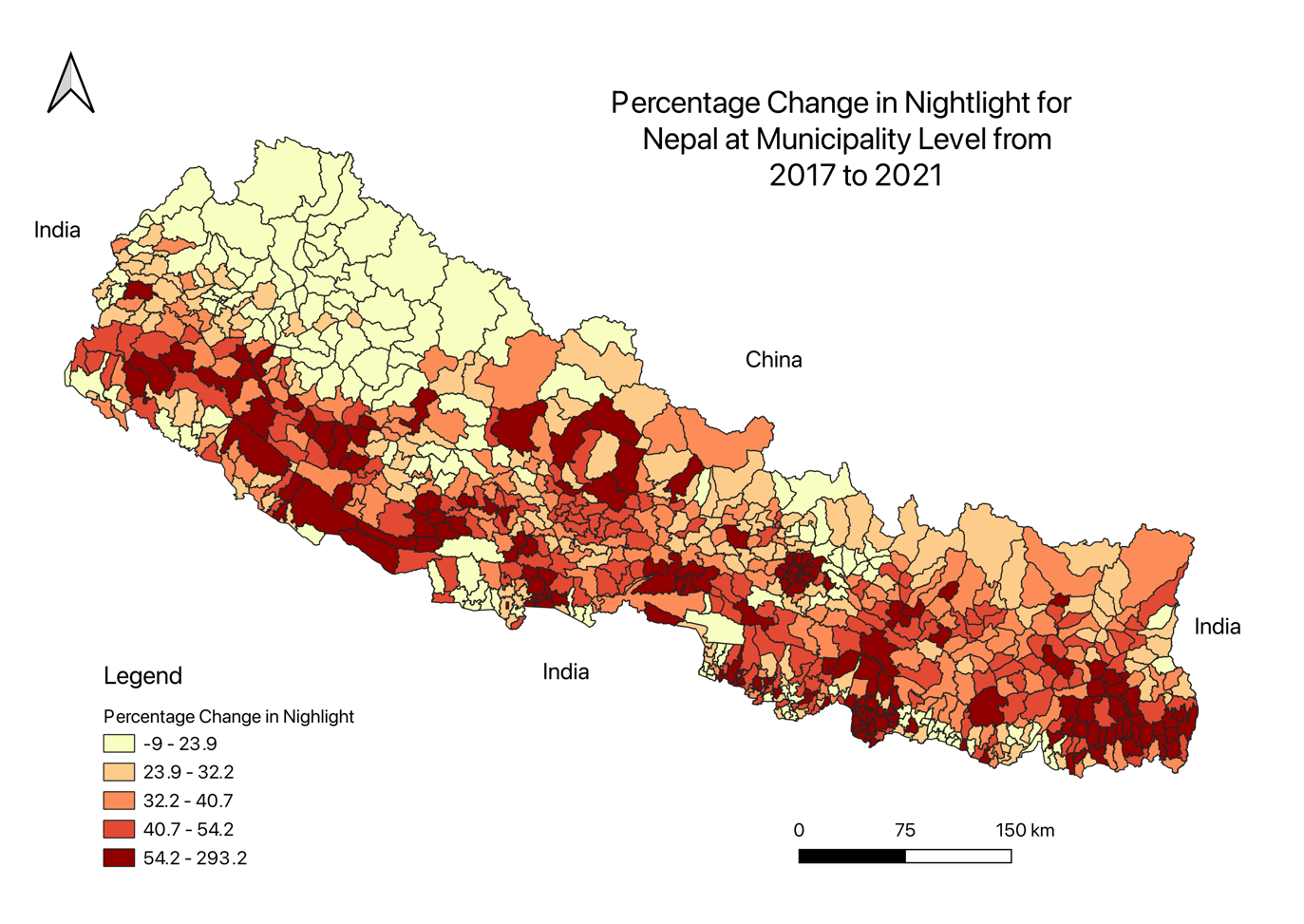
Plausible Explanations:

1. **Drop from 2015 to 2016:** A 7.8 magnitude earthquake hit Nepal in 2015 causing massive destruction of physical infrastructure. An economic blockade from India (60% import partner) that followed further impacted the economy.
2. **Jump from 2016 to 2017:** In Nepal, “Residential load shedding ended since early 2017, and there has been no industrial load shedding since early 2018.” (World Bank, 2019) Alongside, there is also an net positive effect from aid and relief efforts.

A map of the country

Description automatically generated

*Figure 2: Average nightlight per sq.km for Nepal at municipality level from 2014 to 2017*



*Figure 3: Percentage change in Nightlight for Nepal at municipality level from 2017 to 2021*

A graph with blue and orange lines

Description automatically generated

*Figure 4: Evolution of ln(Real GDP) and ln(sum of nightlight) in Nepal from 2012-2023*

A graph with blue lines and dots

Description automatically generated

*Figure 5: Box plot of log (Δnight light from 2017 to 2021) across 7 provinces*

# Institutional Capacity

* Local Government Institutional Capacity Self-Assessment (LISA)
  + An assessment metric introduced by Ministry of Federal Affairs and General Administration in 2020/21
  + Focused on day-to-day performance and overall quantitative accomplishments
* An aspect which can be substantially improved without significant investment of capital and labor
* LISA Breakdown:

|  |  |  |
| --- | --- | --- |
| **SN** | **Category Title** | **Points** |
| 1 | Governance Management | 9 |
| 2 | Organization & Administration | 8 |
| 3 | Budget Plan Management | 11 |
| 4 | Fiscal Economic Management | 11 |
| 5 | Service Delivery | 16 |
| 6 | Judicial Execution | 9 |
| 7 | Physical Infrastructure | 13 |
| 8 | Social Inclusion | 10 |
| 9 | Environmental Protection and Disaster Management | 10 |
| 10 | Cooperation and Coordination | 6 |
|  | **Total** | **100** |

* Each of the LISA Category is weighted with sub-categories as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Indicators** | **Process Scenario** | **Quantitative Scenario** | **Total** |
| 21% | 34% | 45% | 100% |

* For instance, Cooperation and Coordination is calculated as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **10. Cooperation and Coordination Overall Scenario (6 points)** | | | | | |
| 10.1Indicators | | 10.2 Process Scenario | 10.3 Quantitative Scenario | | |
| 10.1.1 cooperation and coordination among federal, province & local governments | 10.1.2 Inter local governments cooperation and coordination | 10.2.1 Formation and operation of inter-local governments committee (more than two local governments) to address common interests. | 10.3.1 Inter-government coordination and facilitation | 10.3.2 Inter local governments partnership | 10.3.3 Coordination with District Development Committee |

A graph with blue squares and numbers

Description automatically generated

*Figure 6: Box plot of average LISA score of 2020/21 and 2021/22 across 7 provinces*

*A graph with blue dots and red lines

Description automatically generated*

*Figure 7: Scatter plot with fitted line of log (Δnight light from 2017 to 2021) over average LISA score of 2020/21 and 2021/22*

*A graph with blue dots

Description automatically generated*

*Figure 8: Scatter plot with fitted line of log (Δnight light from 2017 to 2021) over average cooperation and coordination score of 2020/21 and 2021/22*

# Educational Outcome

* Currently have the data on population that has high school qualification
  + Will be replacing with population that has high school qualification and above

A graph of blue squares and dots

Description automatically generated

*Figure 9: Box plot of high school attainment percent per 2021cencus across 7 provinces*

A graph with blue dots and red line

Description automatically generated

*Figure 10: Scatter plot with fitted line of log (Δnight light from 2017 to 2021) high school attainment percent per 2021cencus*

# Political Leadership

* Focused on chairperson only
* Only 14 female observations across 735 observations

A graph with blue lines and dots

Description automatically generated

*Figure 11: Box plot of log (Δnight light from 2017 to 2021) across male and female. 0 indicates males whereas 1 indicates female.*

A graph with blue squares and lines

Description automatically generated

*Figure 12: Box plot of age at election in 2017 across 7 provinces*

A graph showing a number of red and green dots

Description automatically generated

*Figure 13: scatter plot of log (Δnight light from 2017 to 2021) over age at election of municipality chairperson in 2017. Red dots indicate the affiliation to opposition whereas green dots indicate the affiliation to government coalition.*

# Variables and Date Sources

1. **chgnl**: log (sum of night light of 2021 – sum of nightlight of 2017)

*Extracted from* [*VIIRS Nighttime Lights dataset*](https://eogdata.mines.edu/products/vnl/) *using QGIS software*

1. **log\_baseline\_nl:** log (average of sum of night light of 2014, 2015, 2016, 2017)

*Extracted from* [*VIIRS Nighttime Lights dataset*](https://eogdata.mines.edu/products/vnl/) *using QGIS software*

1. **lisa\_avg**: average LISA score of 2020/21 and 2021/22 (In case, LISA score of 2020/21 was not available, LISA score of 20 21/22 is considered to be the average)

*Downloaded from* [*LISA website*](https://lisa.mofaga.gov.np/home) *of the government of Nepal*

1. **high\_school\_percentage:** percentage of population who have completed high school (to be changed to percentage of population who have completed high school or above)

*Manually constructed dataset from datasets of each province from* [*National Population and Housing Census 2021*](https://censusnepal.cbs.gov.np/results/literacy)

1. **ageatelection**: age of chairperson at election in 2017  
   *Manually constructed dataset from* [*the election result pdfs*](https://oldsite.election.gov.np/election/en/election-result-book.html) *published in Nepali*

1. **gov\_coalition**: dummy variable Government Coalition = 1 if the chairperson of the municipality is affiliated with the parties in the federal government coalition

*Manually constructed dataset from* [*the election result pdfs*](https://oldsite.election.gov.np/election/en/election-result-book.html) *published in Nepali and then coded in Stata*

1. **female**: dummy variable female = 1if the chairperson is a female  
   *Manually constructed dataset from* [*the election result pdfs*](https://oldsite.election.gov.np/election/en/election-result-book.html) *published in Nepali and then coded in Stata*
2. **ln\_popn**: log of population as per census of 2021

*Extracted from the* [*Preliminary Data of National Population and Housing Census 2021*](https://opendatanepal.com/dataset/preliminary-data-of-national-population-and-housing-census-2021)

1. **LISA sub-categories averages of 2020/21 and 2021/22**

|  |  |  |  |
| --- | --- | --- | --- |
| **SN** | **Category Title** | **Points** | **Coded variable** |
| 1 | Governance Management | 9 | gov\_magm\_avg |
| 2 | Organization & Administration | 8 | org\_admin\_avg |
| 3 | Budget Plan Management | 11 | budg\_magm\_avg |
| 4 | Fiscal Economic Management | 11 | fiscal\_magm\_avg |
| 5 | Service Delivery | 16 | service\_dev\_avg |
| 6 | Judicial Execution | 9 | jud\_exe\_avg |
| 7 | Physical Infrastructure | 13 | phy\_infra\_avg |
| 8 | Social Inclusion | 10 | soc\_inc\_avg |
| 9 | Environmental Protection and Disaster Management | 10 | env\_protec\_avg |
| 10 | Cooperation and Coordination | 6 | cop\_cor\_avg |
|  | **Total** | **100** |  |

# Regression Results

1. Initial Regression

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| VARIABLES | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl |
|  |  |  |  |  |  |  |  |  |
| log\_baseline\_nl | 0.979\*\*\* | 0.960\*\*\* | 0.949\*\*\* | 0.949\*\*\* | 0.949\*\*\* | 0.948\*\*\* | 0.946\*\*\* | 0.929\*\*\* |
|  | (0.029) | (0.028) | (0.026) | (0.026) | (0.026) | (0.027) | (0.027) | (0.029) |
| lisa\_avg |  | 0.006\*\*\* | 0.002 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 |
|  |  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| high\_school\_percent |  |  | 0.046\*\*\* | 0.046\*\*\* | 0.046\*\*\* | 0.047\*\*\* | 0.047\*\*\* | 0.044\*\*\* |
|  |  |  | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| ageatelection |  |  |  |  | -0.001 | -0.001 | -0.001 | -0.002 |
|  |  |  |  |  | (0.002) | (0.002) | (0.002) | (0.002) |
| gov\_coalitiion |  |  |  |  |  | -0.038 | -0.038 | -0.038 |
|  |  |  |  |  |  | (0.051) | (0.051) | (0.051) |
| female |  |  |  |  |  |  | 0.212\* | 0.217\* |
|  |  |  |  |  |  |  | (0.119) | (0.123) |
| ln\_popn |  |  |  |  |  |  |  | 0.061\*\* |
|  |  |  |  |  |  |  |  | (0.030) |
| Constant | -0.498\*\*\* | -0.771\*\*\* | -0.828\*\*\* | -0.828\*\*\* | -0.780\*\*\* | -0.750\*\*\* | -0.754\*\*\* | -1.233\*\*\* |
|  | (0.153) | (0.198) | (0.194) | (0.194) | (0.222) | (0.233) | (0.234) | (0.250) |
|  |  |  |  |  |  |  |  |  |
| Observations | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 |
| R-squared | 0.515 | 0.522 | 0.542 | 0.542 | 0.542 | 0.543 | 0.544 | 0.546 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

1. LISA Regression

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| VARIABLES | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| log\_baseline\_nl | 0.979\*\*\* | 0.974\*\*\* | 0.974\*\*\* | 0.968\*\*\* | 0.968\*\*\* | 0.968\*\*\* | 0.966\*\*\* | 0.950\*\*\* | 0.949\*\*\* | 0.949\*\*\* | 0.948\*\*\* | 0.945\*\*\* |
|  | (0.029) | (0.028) | (0.028) | (0.028) | (0.028) | (0.028) | (0.028) | (0.027) | (0.027) | (0.027) | (0.027) | (0.026) |
| gov\_magm\_avg |  | 0.033 | 0.033 | 0.013 | 0.011 | -0.004 | -0.008 | -0.015 | -0.015 | -0.015 | -0.023 | -0.033 |
|  |  | (0.024) | (0.028) | (0.029) | (0.029) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) |
| org\_admin\_avg |  |  | -0.000 | -0.017 | -0.019 | -0.033 | -0.031 | -0.037 | -0.038 | -0.038 | -0.039 | -0.022 |
|  |  |  | (0.021) | (0.024) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) |
| budg\_magm\_avg |  |  |  | 0.038\* | 0.036\* | 0.029 | 0.029 | 0.016 | 0.015 | 0.015 | 0.015 | 0.014 |
|  |  |  |  | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.019) |
| fiscal\_magm\_avg |  |  |  |  | 0.006 | -0.005 | -0.008 | -0.013 | -0.013 | -0.013 | -0.016 | -0.012 |
|  |  |  |  |  | (0.021) | (0.022) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) |
| service\_dev\_avg |  |  |  |  |  | 0.030\*\* | 0.027 | 0.016 | 0.014 | 0.014 | 0.013 | 0.011 |
|  |  |  |  |  |  | (0.015) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) |
| jud\_exe\_avg |  |  |  |  |  |  | 0.017 | 0.007 | 0.007 | 0.007 | 0.004 | -0.016 |
|  |  |  |  |  |  |  | (0.026) | (0.026) | (0.026) | (0.026) | (0.026) | (0.026) |
| phy\_infra\_avg |  |  |  |  |  |  |  | 0.042\*\*\* | 0.041\*\*\* | 0.041\*\*\* | 0.034\*\*\* | 0.030\*\* |
|  |  |  |  |  |  |  |  | (0.012) | (0.012) | (0.013) | (0.013) | (0.012) |
| soc\_inc\_avg |  |  |  |  |  |  |  |  | 0.007 | 0.007 | 0.002 | -0.003 |
|  |  |  |  |  |  |  |  |  | (0.016) | (0.017) | (0.017) | (0.017) |
| env\_protec\_avg |  |  |  |  |  |  |  |  |  | -0.000 | -0.013 | -0.026 |
|  |  |  |  |  |  |  |  |  |  | (0.018) | (0.018) | (0.018) |
| cop\_cor\_avg |  |  |  |  |  |  |  |  |  |  | 0.051\*\*\* | 0.046\*\*\* |
|  |  |  |  |  |  |  |  |  |  |  | (0.016) | (0.016) |
| high\_school\_percent |  |  |  |  |  |  |  |  |  |  |  | 0.045\*\*\* |
|  |  |  |  |  |  |  |  |  |  |  |  | (0.009) |
| Constant | -0.498\*\*\* | -0.717\*\*\* | -0.717\*\*\* | -0.719\*\*\* | -0.725\*\*\* | -0.728\*\*\* | -0.725\*\*\* | -0.514\*\* | -0.497\* | -0.498\* | -0.379 | -0.478\* |
|  | (0.153) | (0.247) | (0.246) | (0.246) | (0.250) | (0.248) | (0.248) | (0.249) | (0.256) | (0.257) | (0.260) | (0.255) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Observations | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 |
| R-squared | 0.515 | 0.516 | 0.516 | 0.519 | 0.519 | 0.521 | 0.521 | 0.528 | 0.528 | 0.528 | 0.533 | 0.551 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

1. Revised Regression

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| VARIABLES | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl | chgnl |
|  |  |  |  |  |  |  |  |  |  |
| log\_baseline\_nl | 0.979\*\*\* | 0.953\*\*\* | 0.949\*\*\* | 0.940\*\*\* | 0.939\*\*\* | 0.938\*\*\* | 0.938\*\*\* | 0.936\*\*\* | 0.922\*\*\* |
|  | (0.029) | (0.027) | (0.027) | (0.026) | (0.026) | (0.026) | (0.026) | (0.027) | (0.029) |
| phy\_infra\_avg |  | 0.040\*\*\* | 0.025\*\* | 0.014 | 0.014 | 0.015 | 0.015 | 0.016 | 0.013 |
|  |  | (0.010) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| cop\_cor\_avg |  |  | 0.042\*\*\* | 0.030\*\* | 0.031\*\* | 0.030\*\* | 0.030\*\* | 0.030\*\* | 0.030\*\* |
|  |  |  | (0.015) | (0.014) | (0.015) | (0.015) | (0.015) | (0.015) | (0.014) |
| high\_school\_percent |  |  |  | 0.042\*\*\* | 0.043\*\*\* | 0.042\*\*\* | 0.042\*\*\* | 0.043\*\*\* | 0.041\*\*\* |
|  |  |  |  | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| ageatelection |  |  |  |  | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 |
|  |  |  |  |  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| female |  |  |  |  |  | 0.215\* | 0.215\* | 0.215\* | 0.218\* |
|  |  |  |  |  |  | (0.121) | (0.121) | (0.124) | (0.127) |
| gov\_coalitiion |  |  |  |  |  |  |  | -0.044 | -0.043 |
|  |  |  |  |  |  |  |  | (0.051) | (0.050) |
| ln\_popn |  |  |  |  |  |  |  |  | 0.052\* |
|  |  |  |  |  |  |  |  |  | (0.031) |
| Constant | -0.498\*\*\* | -0.607\*\*\* | -0.588\*\*\* | -0.756\*\*\* | -0.675\*\*\* | -0.680\*\*\* | -0.680\*\*\* | -0.642\*\*\* | -1.056\*\*\* |
|  | (0.153) | (0.160) | (0.160) | (0.168) | (0.202) | (0.203) | (0.203) | (0.218) | (0.249) |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 |
| R-squared | 0.515 | 0.525 | 0.529 | 0.547 | 0.547 | 0.548 | 0.548 | 0.549 | 0.550 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Reflections

* Working on an independent project is sometimes daunting and lonely
  + Sometimes I get stuck with “I don’t know what to do next!”
* Realization of both ambition and caution
  + How do I understand causality with simply the training of ECON31
* Regardless of the uncertainty, I have enjoyed the process of independent study
* What inspires me to wake up every day and work on the project
  + I am employing my knowledge in my own context
  + Envisioning that one day my work could be a policy recommendation for strengthening federalism in Nepal and beyond
  + Knowing that I am learning and discovering everyday
  + Looking back at my only other empirical project---final project of ECON31

# Key Questions

* What further can I accomplish with this dataset?
* How can I turn this summer research into:
  + A publishable paper
  + An aid to research position (and later grad school) applications

# 

# Sources

Li, J., Xue, E., Wei, Y. *et al.* How popularising higher education affects economic growth and poverty alleviation: empirical evidence from 38 countries. *Humanit Soc Sci Commun* **11**, 520 (2024). <https://doi.org/10.1057/s41599-024-03013-5>

Li, J., Xue, E., Wei, Y. *et al.* How popularising higher education affects economic growth and poverty alleviation: empirical evidence from 38 countries. *Humanit Soc Sci Commun* **11**, 520 (2024). <https://doi.org/10.1057/s41599-024-03013-5>

Liu H, He X, Bai Y, Liu X, Wu Y, Zhao Y, Yang H. Nightlight as a Proxy of Economic Indicators: Fine-Grained GDP Inference around Chinese Mainland via Attention-Augmented CNN from Daytime Satellite Imagery. *Remote Sensing*. 2021; 13(11):2067. <https://doi.org/10.3390/rs13112067>

Tveit, T., Skoufias, E. & Strobl, E. Using VIIRS nightlights to estimate the impact of the 2015 Nepal earthquakes. *Geoenviron Disasters* **9**, 2 (2022). <https://doi.org/10.1186/s40677-021-00204-z>

World Bank, Power-Less to Powerful , 2019, Accessed on July 6, 2024 <https://www.worldbank.org/en/news/feature/2019/11/25/power-less-to-powerful>

1. In a recent empirical study of 38 countries, Li et al. (2024) found that population segments with higher education had a significantly positive impact on GDP growth. [↑](#footnote-ref-1)
2. Liu et al. (2021) found nightlight data as a strong indicator of GDP of China. Ghosh et al. (2013) demonstrate that nightlights data is a strong proxy for determining human well-being. [↑](#footnote-ref-2)
3. Tveit et al. (2022) used VIIRS nightlights data to estimate the impact of 2015 earthquakes in Nepal. [↑](#footnote-ref-3)