An Assessment of

Impact of Institutional Capacity,

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

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# 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. After preliminary findings, I am microscopically analyzing the most significant aspect of institutional capacity---intergovernmental co-ordination and cooperation.

In terms of educational outcomes, I am focusing on the percentage of the population with a high school degree or above. There is a plethora of literature that affirms that higher educational attainment among the population yields higher economic growth. 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 for a developing country like Nepal as a large share of economy is in informal sector, which is not effectively captured by GDP
* Researchers have used VIIRS night light data to analyze:
  + Post earthquake recovery in Nepal
  + Post covid recovery in Nepal
* Researchers have shown a strong correlation between log of total sum of night light data of Nepal and log of real GDP
  + I am currently working on extracting datasets to verify the correlation from 2017 to 2021.

A graph with a line and numbers

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*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)

A map of the country

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

A map of nepal with different colored areas

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

A graph with blue and orange lines

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*Figure 2: Evolution of ln(Real GDP) and ln(sum of nightlight) in Nepal from 2012-2023*

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*Figure 3: 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 |

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*Figure 4: 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 5: 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 6: 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
* It has an interesting impact in the regression

A graph of blue squares and dots

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

A graph with blue dots and red line

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*Figure 8: 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

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*Figure 9: 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

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*Figure 10: Box plot of age at election in 2017 across 7 provinces*

A graph showing a number of red and green dots

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*Figure 11: 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. **y**: 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. **x1**:
2. **x2**: log baseline = 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. **x3**: 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. **x4**: dummy variable Urban = 1 if a local government is municipality, sub-metropolitan city, metropolitan city

*Coded in Stata*

1. **x5**: 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. **x6**: 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*
2. **x7**: 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*
3. **x8**: 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)

# 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

# Key Questions

* Could you help me think what a revised model may like? Do I omit the insignificant categories of LISA?
* Should I do further breakdown of sub categories of Cooperation and Coordination?
* Should I construct a more comprehensive dataset of education?
  + It could include the levels of educations.
    - It sets me up to analyze impact of each level of education in change in nightlight.
* Could you give me suggestions on how should I approach presentation to Prof. Olivero tomorrow?
* Way forwards:

# Sources

1. Power-Less to Powerful, World Bank, Nov 5, 2019, Accessed on July 6, 2024

<https://www.worldbank.org/en/news/feature/2019/11/25/power-less-to-powerful>