Testing Political Proximity as an Instrumental Variable

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# Institutional Capacity Breakdown

* 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
* 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% |

* 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 (federal and provincial) coordination and facilitation | 10.3.2 Inter local governments partnership | 10.3.3 Coordination with District Development Committee |

* 6 out of 6 Cooperation and Coordination score can be achieved if the following conditions are met:
  + **10.1.1:** The local government does necessary coordination of policies and action with the federal and provincial government before setting its annual policies and programs and regularly provides tax revenue share to the provincial government.
  + **10.1.2:** The local government has policies and structures in place to collaborate and coordinate with other local governments in issues of common concerns and annually has at least one program to address common concerns with joint investment.
  + **10.2.1:** Joint committees are formed and are actively working among local governments on matters of common interests and concerns.
  + **10.3.1:** The local government is well informed about implementation and facilitation of federal and provincial level projects and has set up an active institution for it.
  + **10.3.2:** The local government has collaborated with other local governments to run one or more program to minimize costs, maximize the use of resources or provide effective service delivery.
  + **10.3.3:** In regards of development and construction activities, the local government has discussed the feedback, suggestion and monitoring reports of District Development Committee in its executive body and has taken necessary decision.
* For each score of LISA, I take the average of the FY 20/21 and FY 21/22 and convert them into **percentage** (for intuitive comprehension of the coefficients)

# Cooperation and Coordination Breakdown

* For my research, I group the 6 LISA categorizers into the following three variables:
  + **fed\_cop =** ((avg 10.1.1 + avg 10.3.1) / 2) \* 100
    - It measures the cooperation and coordination sub-score that relates with federal government and provincial government, represented by 10.1.1 and 10.3.1
  + **local\_cop =** ((avg 10.1.2 + avg 10.2.1 + avg 10.3.2) / 3) \* 100
    - It measures the cooperation and coordination sub-score that relates with other local governments, represented by 10.1.2, 10.2.1 and 10.3.1.
  + **ddc\_cop** = (avg 10.3.3) \* 100
    - It measures the cooperation and coordination sub-score that relates with district development committee, represented by 10.3.3.

# 

# Variables and Date Sources

1. **Cooperation and Coordination Breakdown**For my research, I group the 6 LISA categorizers into the following three variables and express them in percentage:
   * **fed\_cop =** ((avg 10.1.1 + avg 10.3.1) / 2) \* 100
     + It measures the cooperation and coordination sub-score that relates with federal government and provincial government, represented by 10.1.1 and 10.3.1
   * **local\_cop =** ((avg 10.1.2 + avg 10.2.1 + avg 10.3.2) / 3) \* 100
     + It measures the cooperation and coordination sub-score that relates with other local governments, represented by 10.1.2, 10.2.1 and 10.3.1.
   * **ddc\_cop** = (avg 10.3.3) \* 100
     + It measures the cooperation and coordination sub-score that relates with district development committee, represented by 10.3.3.
2. **rel\_chgnl**: ln (sum of nightlight of 2021) – ln (sum of nightlight of 2017)

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

1. **ln\_baseline\_nl\_km:** log [(average of sum of night light of 2014, 2015, 2016, 2017)/area of municipality]

*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 and above  
   (Higher Secondary level or equivalent + Graduate level or equivalent +Post Graduate level or equivalent)

*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*
2. **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 = 1 if 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. **urban\_num**: dummy variable = 1 if the local level is municipality, sub-metropolitan city or metropolitan city i.e. non rural municipality
2. **neighbour\_percentage**: (total no. of neighbors with chairperson belonging to same party/total no. of neighbors) \* 100
3. **Percentage of average points score in LISA subcategories in 2020/21 and 2021/22**

**(**I am converting the obtained scores in percentage for intuitive comprehension of the coefficients)

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

# Main Regression

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| VARIABLES | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl |
|  |  |  |  |  |  |  |  |  |  |
| gov\_magm\_per | -0.000 | -0.000 | -0.001 | -0.000 | -0.000 | -0.000 | -0.001 | -0.001 | -0.001 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| org\_admin\_per | -0.001 | -0.001 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| budg\_magm\_per | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| fiscal\_magm\_per | -0.001\* | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| service\_dev\_per | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| jud\_exe\_per | -0.000 | -0.000 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001\* |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| phy\_infra\_per | 0.001\*\* | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| soc\_inc\_per | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| env\_protec\_per | 0.000 | -0.000 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001\*\* | -0.001\*\* | -0.001\*\* |
|  | (0.001) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| fed\_cop | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| local\_cop | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.001\*\*\* |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| ddc\_cop | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| ln\_baseline\_nl\_km |  | 0.073\*\*\* | 0.045\*\*\* | 0.045\*\*\* | 0.046\*\*\* | 0.045\*\*\* | 0.001 | 0.001 | -0.003 |
|  |  | (0.014) | (0.013) | (0.013) | (0.013) | (0.013) | (0.016) | (0.016) | (0.016) |
| high\_school\_percent |  |  | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.010\*\*\* |
|  |  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| ageatelection |  |  |  | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.001 |
|  |  |  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| female |  |  |  |  | 0.065 | 0.065 | 0.059 | 0.059 | 0.056 |
|  |  |  |  |  | (0.050) | (0.051) | (0.051) | (0.051) | (0.050) |
| gov\_coalitiion |  |  |  |  |  | -0.017 | -0.017 | -0.017 | -0.019\* |
|  |  |  |  |  |  | (0.012) | (0.011) | (0.011) | (0.011) |
| ln\_popn |  |  |  |  |  |  | 0.052\*\*\* | 0.052\*\*\* | 0.064\*\*\* |
|  |  |  |  |  |  |  | (0.009) | (0.009) | (0.012) |
| urban\_num |  |  |  |  |  |  |  |  | -0.031\* |
|  |  |  |  |  |  |  |  |  | (0.017) |
| Constant | 0.382\*\*\* | 0.318\*\*\* | 0.308\*\*\* | 0.321\*\*\* | 0.318\*\*\* | 0.328\*\*\* | -0.159 | -0.159 | -0.267\*\* |
|  | (0.062) | (0.060) | (0.059) | (0.067) | (0.067) | (0.068) | (0.107) | (0.107) | (0.127) |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 691 | 691 | 691 | 691 | 691 | 691 | 691 | 691 | 691 |
| R-squared | 0.063 | 0.122 | 0.178 | 0.179 | 0.182 | 0.184 | 0.213 | 0.213 | 0.218 |

Robust standard errors in parentheses

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

# IV Outline by Prof O’Connell

**Step 1:** Using OLS, estimate a **'reduced form'** growth equation that excludes cooperation, but includes your instrument (call it Z) and the other variables. Call the estimated coefficient on your instrument "a": this is the 'reduced form' impact of the instrument on growth.

**Step 2:** Using OLS, estimate a '**first stage'** regression of cooperation (dependent variable) on your instrument and the other variables in the structural equation. Let's call the estimated coefficient on Z "c": this is the ceteris paribus, causal impact of your instrument on cooperation.

**Step 3:** Calculate b = a/c. This is an IV estimate of the causal impact of one extra 'unit' of cooperation on growth!

Or can be implemented using two stages least squares using Stata, which yields a more complicated calculation for b, but one that follows the same intuition

In order for the IV estimate to be valid, you need to satisfy 2 conditions:

(1) RELEVANCE: Your instrument, Z, must have a strong effect in predicting cooperation. This condition is testable by looking at the t statistic on Z in the first-stage regression, which should be something like 3 or more for a good instrument.

(2) EXCLUSION: Your instrument cannot have any direct effect of its own on growth; it must affect growth only via its impact on cooperation. This requirement is not testable -- it is a maintained hypothesis (if you have multiple instruments, you can test the validity of each of them assuming the others are valid, but you cannot test the validity of the whole set).

# Political Proximity as IV

* I am using political proximity between local levels as an instrumental variable. I am specifically looking at neighboring local levels for each local level and calculating the percentage of neighbors that they have whose chairperson belong to the same party.
* I opted for political proximity because I already had data on the political affiliation of the chairperson of each local level from the election of 2017.

**Assumptions:**

* Chairpersons have the highest executive authority in a local level. Thus, they might have the most influence when it comes to cooperation with neighboring municipalities.
* Comradery and rivalry within regional party politics:
  + Federal elections constituency consist of multiple local levels
  + Chairpersons of the same party might have worked as comrades in local committees of their party making it easier and convenient to cooperate.
  + In contrary, chairpersons form opposing party might have known each other as political rivals, making them less likely to cooperate.
* Chairpersons from same party are likely to prioritize similar plans and policies that resonate with their parties promise during election.

**Limitations:**

* Chairpersons may not indicate party affinity of majority of the population:
  + In some local levels, chairperson and vice chairperson are from different political parties.
  + Since chairpersons are elected through first past the post system, which means that the elected candidates necessarily do not represent sentiment of the majority. For instance, a local level can have a party chairperson from party A with 40% of the votes but the candidates from party B and C could have 30% votes each.
* Wards can provide an accurate measurement:
  + Local levels are composed of smaller administrative units called wards who have elected chairpersons as well. Total votes at a ward level can be a more precise measure of political affinity of a municipality However, such data is even more difficult to retrieve from Nepal pdfs as there are 6,743 total wards in Nepal.
* Ethnicity could triumph over political affiliation.

**Calculation:**

* First, I rendered data on neighbors for each local level.
* Then I matched them with their corresponding party affiliation.
* Finally, I calculated the percentage of neighbors that have chairperson from the same political party.
* **neighbor\_percent** = (total no. of neighbors with chairperson belonging to same party/total no. of neighbors) \* 100

# Visuals of Political Affinity

A map of nepal with different colored areas

Description automatically generated

*Figure 1: Local Level Election Results of Nepal 2017*

# Reduced form Regression

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| VARIABLES | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl | rel\_chgnl |
|  |  |  |  |  |  |  |  |  |  |
| neighbor\_percent | 0.001\*\* | 0.001\* | 0.001\*\*\* | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
|  | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| gov\_magm\_per |  | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| org\_admin\_per |  | -0.001\* | -0.001 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) |
| budg\_magm\_per |  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| fiscal\_magm\_per |  | -0.001\* | -0.000 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| service\_dev\_per |  | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| jud\_exe\_per |  | -0.000 | -0.000 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001\* |
|  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| phy\_infra\_per |  | 0.001\*\*\* | 0.001\* | 0.001\* | 0.001\* | 0.001\* | 0.001\* | 0.001 | 0.001 |
|  |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| soc\_inc\_per |  | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 |
|  |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| env\_protec\_per |  | 0.001 | 0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.001\* | -0.001\* |
|  |  | (0.001) | (0.001) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) | (0.000) |
| fed\_cop |  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000\* | 0.000\* |
|  |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| ddc\_cop |  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| ln\_baseline\_nl\_km |  |  | 0.083\*\*\* | 0.052\*\*\* | 0.052\*\*\* | 0.053\*\*\* | 0.053\*\*\* | 0.006 | 0.002 |
|  |  |  | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.017) | (0.017) |
| high\_school\_percent |  |  |  | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* | 0.009\*\*\* |
|  |  |  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) |
| ageatelection |  |  |  |  | -0.000 | -0.000 | -0.000 | -0.000 | -0.001 |
|  |  |  |  |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| female |  |  |  |  |  | 0.071 | 0.071 | 0.064 | 0.062 |
|  |  |  |  |  |  | (0.050) | (0.051) | (0.051) | (0.050) |
| gov\_coalitiion |  |  |  |  |  |  | -0.018 | -0.019 | -0.020\* |
|  |  |  |  |  |  |  | (0.012) | (0.012) | (0.012) |
| ln\_popn |  |  |  |  |  |  |  | 0.054\*\*\* | 0.066\*\*\* |
|  |  |  |  |  |  |  |  | (0.009) | (0.012) |
| urban\_num |  |  |  |  |  |  |  |  | -0.031\* |
|  |  |  |  |  |  |  |  |  | (0.017) |
| Constant | 0.321\*\*\* | 0.357\*\*\* | 0.289\*\*\* | 0.286\*\*\* | 0.298\*\*\* | 0.294\*\*\* | 0.306\*\*\* | -0.200\* | -0.307\*\* |
|  | (0.010) | (0.061) | (0.059) | (0.058) | (0.066) | (0.066) | (0.068) | (0.107) | (0.128) |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 691 | 691 | 691 | 691 | 691 | 691 | 691 | 691 | 691 |
| R-squared | 0.007 | 0.043 | 0.117 | 0.169 | 0.169 | 0.173 | 0.175 | 0.207 | 0.212 |

Robust standard errors in parentheses

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

# First Stage Regression

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| VARIABLES | local\_cop | local\_cop | local\_cop | local\_cop | local\_cop | local\_cop | local\_cop | local\_cop |
|  |  |  |  |  |  |  |  |  |
| neighbor\_percent | 0.272\*\*\* | 0.142 | 0.183\*\* | 0.177\* | 0.160\* | 0.161\* | 0.047 | 0.053 |
|  | (0.095) | (0.091) | (0.093) | (0.093) | (0.093) | (0.093) | (0.082) | (0.071) |
| high\_school\_percent |  | 1.619\*\*\* | 1.288\*\*\* | 1.234\*\*\* | 1.193\*\*\* | 1.184\*\*\* | 0.338 | 0.266 |
|  |  | (0.233) | (0.244) | (0.251) | (0.251) | (0.252) | (0.227) | (0.189) |
| ln\_popn |  |  | 5.872\*\*\* | 4.732\*\* | 4.263\*\* | 4.257\*\* | 2.362 | 3.416\*\* |
|  |  |  | (1.594) | (1.888) | (1.892) | (1.890) | (1.654) | (1.553) |
| urban\_num |  |  |  | 3.235 | 3.524 | 3.572 | 1.701 | 2.626 |
|  |  |  |  | (3.024) | (3.008) | (3.004) | (2.656) | (2.337) |
| ageatelection |  |  |  |  | 0.265\*\* | 0.271\*\* | 0.236\*\* | 0.112 |
|  |  |  |  |  | (0.126) | (0.126) | (0.108) | (0.094) |
| female |  |  |  |  |  | 4.948 | 3.420 | 4.670 |
|  |  |  |  |  |  | (8.290) | (6.856) | (5.018) |
| gov\_magm\_per |  |  |  |  |  |  | 0.069 | -0.091 |
|  |  |  |  |  |  |  | (0.103) | (0.092) |
| org\_admin\_per |  |  |  |  |  |  | -0.000 | -0.031 |
|  |  |  |  |  |  |  | (0.084) | (0.076) |
| budg\_magm\_per |  |  |  |  |  |  | 0.055 | 0.112 |
|  |  |  |  |  |  |  | (0.098) | (0.084) |
| fiscal\_magm\_per |  |  |  |  |  |  | 0.166 | 0.106 |
|  |  |  |  |  |  |  | (0.102) | (0.091) |
| service\_dev\_per |  |  |  |  |  |  | 0.108 | 0.121 |
|  |  |  |  |  |  |  | (0.113) | (0.102) |
| jud\_exe\_per |  |  |  |  |  |  | 0.067 | 0.035 |
|  |  |  |  |  |  |  | (0.074) | (0.066) |
| phy\_infra\_per |  |  |  |  |  |  | 0.265\*\*\* | 0.141\*\* |
|  |  |  |  |  |  |  | (0.080) | (0.068) |
| soc\_inc\_per |  |  |  |  |  |  | 0.050 | -0.092 |
|  |  |  |  |  |  |  | (0.066) | (0.061) |
| env\_protec\_per |  |  |  |  |  |  | 0.443\*\*\* | 0.247\*\*\* |
|  |  |  |  |  |  |  | (0.094) | (0.083) |
| fed\_cop |  |  |  |  |  |  |  | 0.388\*\*\* |
|  |  |  |  |  |  |  |  | (0.039) |
| ddc\_cop |  |  |  |  |  |  |  | 0.149\*\*\* |
|  |  |  |  |  |  |  |  | (0.028) |
| Constant | 27.926\*\*\* | 13.591\*\*\* | -43.788\*\*\* | -32.756\* | -40.206\*\* | -40.464\*\* | -74.170\*\*\* | -60.543\*\*\* |
|  | (1.881) | (2.648) | (15.913) | (18.733) | (19.037) | (19.048) | (17.294) | (15.475) |
|  |  |  |  |  |  |  |  |  |
| Observations | 691 | 691 | 691 | 691 | 691 | 691 | 691 | 691 |
| R-squared | 0.013 | 0.082 | 0.101 | 0.102 | 0.109 | 0.109 | 0.338 | 0.489 |

Robust standard errors in parentheses

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

IV Validity

* A statistical test for a good IV is its relevance: a t-statistic of 3 or more in “first-stage regression”.
* Initial t-static is 2.87, but it drops to 0.75 after adding all the other controls. So, political proximity might not be a good IV.

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# Two-stage least squares in Stata

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# Way Forward

* Explore ethnic proximity as an instrumental variable. The census report of 2021 provides data on ethnic/caste distribution for each municipality.
* Reach out to stakeholders to further understand what factors are conducive to economic growth.
* Analysis the data by excluding province that has extreme party affiliation and educational outcome heterogeneity