

Harvard University Department of Economics
Fall 2024
Econ 970: Sophomore Tutorial
Infrastructure in Developing Countries

Instructor: Nikhil Kumar

Email: nikhil_kumar1@g.harvard.edu

Tutorial Time: T/Th 9:00am-10:15am

Location: Sever 112

Office Hours: 10:30-11:45 am on Tuesday or Thursday (tentative) or by appointment

Tutorial Website: <https://canvas.harvard.edu/courses/138595>

Description

Infrastructure bottlenecks in transport, energy and telecommunications as well as health, education, water and agriculture still present major hurdles for economic growth in developing countries. They are major sources of challenges and opportunities for developing countries in terms of expanding output and productivity, alleviating poverty and inequality, improving labor market outcomes and human capital formation, and unlocking the benefits of trade. For example, expansion of digital infrastructure (broadband internet, mobile phone etc.) has the potential to improve firm productivity and employment as well as reduce price dispersion. Rural roads and electrification could lead structural transformation and improved human capital formation. Public transportation in cities, railways and highways could lead to urbanization and boost economic growth.

Understanding these changes holistically needs a multi-faceted approach in research tools and methodology. This tutorial will combine insights from frontier empirical research in the fields of development economics and urban economics. The objective of the tutorial is to develop the skill set and training to be able to tackle questions related to infrastructure in developing countries. The tutorial will also emphasize in-depth readings of recent innovative papers, focusing particularly on understanding the different methods used and their applications to answer important research questions.

Goals

- learn to read, understand and synthesize frontier research papers
- learn how to empirically answer research questions
- learn different methods of measurement and analysis used to approach a research question
- learn key research skills and develop your own research project

Prerequisites

A course in intermediate microeconomics and introductory statistics is required.

Requirements

Participation (15%)

Attendance, preparation and participation are the best ways to learn the skills you should take away from this tutorial. To make sure you do this well, I want you to attend all the sessions and come prepared for them. This means reading the required materials before each session and participating actively in the discussions. I encourage you to ask both clarificatory as well as substantive questions. Your active participation is vital to your learning.

To that end, attendance and participation is mandatory. You are expected to read all the required readings before each session and be ready to actively participate in the tutorial discussion. You will be frequently asked to participate in discussions with your peers and called on to answer questions related to the readings.

Reflection, 2 paragraphs per week (10%)

We will come across many research articles during this semester. To understand them well, you not only need to read them but also reflect on them. To assist in this, I recommend that you make notes while reading the papers before each session, participate in the discussion based on your understanding, learn from your peers and then reflect on what you learned from the paper as well as the discussion.

From the second week of semester, you will be required to respond to a prompt on Canvas by writing two reflection paragraphs (100-150 words) by midnight each Monday – one each for the readings covered in the past week and for the reading for the current week. These are meant to help you reflect on the papers before having discussed the paper with your peers and after the tutorial discussions with peers. Note that you are allowed to miss 1 pair of reflection paragraphs before your grade starts being affected.

I will make sure to read each of these reflection paragraphs, provide useful comments and try to incorporate your thoughts in the next session. These will help you understand the papers well and will give me a sense of how comfortable you are with the assigned readings, which will help me shape future discussions.

Paper Presentations (5%)

Presenting your own or synthesizing others' work will help you not just understand the material well but also help you think about how to communicate it clearly and concisely to an audience. To that end, I want each one of you to lead the discussion on at least one paper in the semester.

Hence, each student will choose a starred paper on the syllabus to present it to the rest of the tutorial group. This includes summarizing the paper's empirical strategy and findings, anything you particularly liked/disliked/found confusing, and discussing any interesting insights your peers had in class. This also means that you try your best to answer any questions that your peers might have in relation to the paper that you chose to present.

A sign-up sheet will be made available at the beginning of the semester.

Response Papers, 3-4 pages every 2 weeks (20%)

The tutorial is divided into topics that change over the course of the semester. While every article we read is standalone, over time we will start to see common threads across papers within a topic and across topics. Moreover, you will also notice contrasts across papers within a topic and across topics. I want you to remember (or note) these as you read the papers and discuss with peers. At the same time, you will have your own research and/or policy ideas or criticisms related to the papers that we read in each topic. I want you to think carefully and deeply about them and write about them in the form of a response paper that answers a prompt. This will help you think about the "forest" instead of getting lost in the "trees" i.e. think a bit more big picture (but still deeply) on a topic rather than getting super involved with the minutia of a specific paper.

During the semester, you will write 5 such papers in response to prompts. Each paper should be between 4-5 pages (about 1300-1500 words per paper in the form of a pdf document). Your response

papers must be uploaded by midnight every other Friday, starting September 13th. Late papers will not be accepted.

Stata/R Problem Sets (15%)

A necessary skill you should learn during this tutorial is how to work with data, including building or cleaning datasets as well as analyzing them to answer questions that you are interested in. This involves mastering the skill of statistical programming. Economists commonly use Stata or R for their code. You can choose which language you wanted to learn and/or use. If you wish to speak with me about statistical programming, I am more comfortable with Stata than R. However, you are still free to learn Stata or R in the statistical software minicourse.

Like all Ec 970 tutorials, this tutorial's assignments include 4 problem sets from the [mandatory statistical software minicourse](#). It is important that you carefully attend these as they are essential for your final paper. You will need to complete and turn in the code, log files and output.

Research Paper and Presentation (35%)

Besides learning how to read and reflect on papers, this tutorial aims to help you write papers. Every aspect of the tutorial, from reading papers, discussing them with peers, working on problem sets, reflection paragraphs and response papers – all are meant to help to reach a point where you can find a way to address a research question that is important and/or that interests you.

Therefore, the main assignment is writing a term paper on any topic of your choosing. The assignment will be broken into multiple smaller assignments, as detailed below. Note that it is more important that you write a good paper addressing an interesting topic than it is to write a paper on infrastructure related topics. Overall, a good paper would likely cover one of the below, but I am open to alternative suggestions.

1. *An empirical paper using existing data.* The section on data below highlights several data sources you could use. The paper does not necessarily have to be on infrastructure if it's a question that interests you and helps you write a good paper. The paper should attempt to answer a causal question using empirical strategies like most papers we cover in this tutorial. If you do not have a causal identification strategy, you should clearly discuss limitations to a causal interpretation of your results.
2. *An empirical paper using original data.* You could create your own dataset, for example by web scraping the data you need.
3. *Replication and extension paper.* You could replicate a paper using data posted by authors (not always available or complete, so plan to search and attempt early on). In addition to replicating, you should plan to extend the paper, for example by using a more recent technique, looking at additional outcomes (clarifying motivation/theory behind why the extension might be interesting), etc. You are most likely to find papers' data, if it exists, on the authors' website or the publishing journals' website, and sometimes on Harvard dataverse, ICPSR, or IPA/JPAL/AEA dataverse, all of which have been linked below.

Any of the above choices for a research project will require a lot of work and time, so you should start early on and should discuss with me your plans for additional resources and guidance.

The assignment will be broken down to pieces to help you prepare early on. Particularly:

1. **Proposal (10%):** 2-page write-up briefly describing a couple of research ideas [due on October 9th, 2024]

2. **Prospectus (5%):** Revised 5-7-page write-up covering (1) brief overview of background / literature on the question, (2) the economic theory you would be testing, if applicable, (3) the source of data you would be using, and (4) the empirical strategy you have in mind [due on November 13th, 2024]
3. **The presentation (5%):** 15 minutes presentation of your paper [last full week of semester]
4. **The final paper (20%):** should be 15-18 pages (double-spaced) excluding graphs / tables [due on December 12th, 2024]

To assist you in developing your writing skills, you can use this guide [“Writing Economics”](#). Please refer to this regularly as you work on the assignments and the components of the final paper. It will help guide you when you need any assistance.

Of course, you can always reach out to me if you are facing difficulties.

Note on assignments

All written assignments will be **posted on Canvas with their preliminary guidelines and due dates**. Note that all assignment pages should be *double-spaced*, normal font (ex: Times new roman 12pt), standard margins. All assignments should be submitted *on canvas as a pdf document*, email submissions will not be accepted.

Grading

- A [95-100]: excellent work, very good writing (clear, succinct, structured), demonstrate high effort and mastery of the subject, presents relatively interesting ideas or creative approaches
- A- [90-94]: very good work and effort, responds to prompt adequately, makes little mistakes, demonstrates mastery of the subject
- B+ [85-89]: good work, effort, and comprehension; full engagement with the assignment’s requirements
- B [80-84]: fair work and effort; submission might have typos
- B- [75-79]: little work and effort; submission might have conceptual errors, or is hard to follow; work doesn’t follow prompt
- C+, C, C- [<75]: unsatisfactory work, indicates minimal command of the course materials

Policies

Attendance and participation: Attendance will be taken at the start of every session. You are allowed 2 no-questions-asked absences before your grade is affected. All students are expected to participate in the discussion in every session.

Expectations for readings: Most of the readings assigned in this tutorial were published in top-five economics journals. You are not expected to be able to reproduce the mathematical arguments on your own. When reading, focus on the empirical strategy and the intuition behind the economic arguments. Try to figure out where the paper fits into the broader economics literature.

Communication: I will try to get back to your emails within 24 hours; this time might be longer during the holidays. Please keep that in mind especially as assignment deadlines approach. Please include Ec 970 in the subject line for all emails so they don’t get lost in my inbox.

Late assignment policy: Assignments will lose 5 percentage points per 24 hours of delay unless discussed in advance. Please discuss extensions with me in advance. Be aware that you cannot get an extension on the final paper, so plan accordingly to ensure you can complete all of these. Exceptions are given in case of a medical or personal emergency if certified by a doctor or a resident dean.

Working with others: You are free (and encouraged) to discuss problem sets, the assigned papers and the final paper with one another. However, you must hand in your own (unique) code and written work in all cases.

Adaptive AI: Unless explicitly stated, AI tools such as ChatGPT are not permitted in the preparation of reading responses, referee reports or research paper. You may use AI tools to troubleshoot your code for the final paper, except for the Stata/R problem sets.

Support

Your wellbeing is of utmost importance to me. As a student, you may experience a range of challenges that can interfere with learning, such as increased anxiety, strained relationships, feeling down, difficulty concentrating and/or lack of motivation. I recognize that this environment is challenging and that courses are not the only demanding part of your life.

You never owe me personal information about your (mental or physical) health, or anything else. However, feel free to talk to me about things that you are going through. I promise to listen and, if this relates to your learning, I will work with you to make sure that you succeed in this tutorial.

There are also several resources available to you on campus to support your wellness, including [Harvard University Health Services \(HUHS\)](#), [Counseling and Mental Health Services \(CAMHS\)](#), and the [Academic Resource Center \(ARC\)](#), which offers tutoring services, workshops, and coaching, among other services. If you or anyone you know experiences any high levels of stress, difficult life events, or anxiety or depression, I strongly encourage you to seek support.

Statement on Academic Honesty

Discussing ideas and work-in-progress with others is an important and desirable part of the research process, but in the end, a student's assignment must be his or her own effort, written by the student, and ultimately based on his or her own thinking. All written assignments must use appropriate citation practices. If you plagiarize, you will fail the course. For questions about Harvard's stance on academic honesty, consult the [Academic Information](#) section in the Harvard College Handbook for Students.

Tutorial Schedule

Week	Session	Date	Day	Topic
1	1	09/03	T	Tutorial introduction and Overview
1	2	09/05	Th	Econometrics overview I
2		09/09	Mon	Reflection Paragraph #2 due
2	3	09/10	T	Econometrics overview II
2	4	09/12	Th	Digital Infrastructure I
2		09/13	Fri	Response Paper #1 due (extended to Wed 09/18)
3		09/16	Mon	Reflection Paragraphs #3 due
3	5	09/17	T	Digital Infrastructure II
3	6	09/19	Th	Communication Infrastructure I
3		09/20	Fri	Stata/R Problem Set #1 due
4		09/23	Mon	Reflection Paragraphs #4 due
4	7	09/24	T	Communication Infrastructure II
4	8	09/26	Th	Urban Infrastructure I
4		09/27	Fri	Response Paper #2 due
5		09/30	Mon	Reflection Paragraphs #5 due
5	9	10/01	T	Urban Infrastructure I
5	10	10/03	Th	Urban Infrastructure III
5		10/04	Fri	Stata/R Problem Set #2 due
6		10/07	Mon	Reflection Paragraphs #6 due
6	11	10/08	T	Transportation and Energy Infrastructure I
6		10/09	Wed	Research Proposal due - extended to Mon 10/14
6	12	10/10	Th	Transportation and Energy Infrastructure II
6		10/11	Fri	Response Paper #3 due - extended to Mon 10/14
7		10/14	Mon	Reflection Paragraphs #7 due
7	13	10/15	T	Transportation and Energy Infrastructure III
7	14	10/17	Th	Infrastructure, Environment and Climate Change I
7		10/18	Fri	Stata/R Problem Set #3 due
8	15	10/22	T	Meetings to discuss research proposal
8	16	10/24	Th	Meetings to discuss research proposal
8		10/25	Fri	Response Paper #4 due
9		10/28	Mon	Reflection Paragraphs #9 due
9	17	10/29	T	Infrastructure, Environment and Climate Change II
9	18	10/31	Th	Infrastructure, Environment and Climate Change III
9		11/01	Fri	Stata/R Problem Set #4 due
10		11/04	Mon	Reflection Paragraphs #10 due
10	19	11/05	T	Education Infrastructure I
10	20	11/07	Th	Education Infrastructure II

10		11/08	Fri	Response Paper #5 due
11		11/11	Mon	Reflection Paragraphs #11 due
11	21	11/12	T	Health, Water and Sanitation Infrastructure I
11	22	11/14	Th	Health, Water and Sanitation Infrastructure II
11		11/15	Fri	Research Prospectus due
12		11/18	Mon	Reflection Paragraphs #12 due
12	23	11/19	T	Health, Water and Sanitation Infrastructure III
12	24	11/21	Th	Presentations
13	25	11/26	T	Presentations
14	26	12/03	T	No class
		12/12	Th	Final paper due

Readings

Note that the required readings are marked ** and optional readings are marked *. The rest of the papers are for your reference in case you are interested.

1. Introduction and overview

- a. **Foster, V., Gorgulu, N., Straub, S. and Vagliasindi, M., 2023. The impact of infrastructure on development outcomes: A qualitative review of four decades of literature.
- b. Iacovone, L., McIntosh, C., Rogger, D. and Sánchez-Bayardo, L.F., 2023. Local Infrastructure and the Development of the Private Sector: Evidence from a Randomized Trial. Working Paper, World Bank.
- c. Chaurey, R and D T Le (2022), "Infrastructure maintenance and rural economic activity: Evidence from India", Journal of Public Economics 214: 104725.
- d. Dinkelman, T (2011),"The effects of rural electrification on employment: New evidence from South Africa", American Economic Review 101(7): 3078-3108.
- e. Bonadio, B. and Dhabi, N.A., 2021. Ports vs. roads: infrastructure, market access and regional outcomes.
- f. Asturias, J, M García-Santana and R Ramos (2019), "Competition and the Welfare Gains from Transportation Infrastructure: Evidence from the Golden Quadrilateral of India", Journal of the European Economic Association 17(6): 1881–1940.
- g. Ghani, E., A. G. Goswami, and W. R. Kerr (2016), "Highway to Success: The Impact of the Golden Quadrilateral Project for the Location and Performance of Indian Manufacturing", Economic Journal, 126(591), 317–357.

2. Digital Infrastructure (I, II)

State Capacity and Public Service Delivery

- a. **Muralidharan, K., Niehaus, P. and Sukhtankar, S., 2023. Identity verification standards in welfare programs: Experimental evidence from India. Review of Economics and Statistics, pp.1-46.
- b. Muralidharan, K., Niehaus, P., Sukhtankar, S. and Weaver, J., 2021. Improving last-mile service delivery using phone-based monitoring. American Economic Journal: Applied Economics, 13(2), pp.52-82.
- c. Blumenstock, J.E., Callen, M., Faikina, A., Fiorin, S. and Ghani, T., 2023. Strengthening fragile states: Evidence from mobile salary payments in afghanistan. Available at SSRN 4473387.
- d. Muralidharan, K., Niehaus, P. and Sukhtankar, S., 2016. Building state capacity: Evidence from biometric smartcards in India. American Economic Review, 106(10), pp.2895-2929.
- e. *Muralidharan, K., Niehaus, P. and Sukhtankar, S., 2022. Integrating Biometric Authentication in India's Welfare Programs: Lessons from a Decade of Reforms.
- f. Mukhopadhyay, P., Muralidharan, K., Niehaus, P. and Sukhtankar, S., 2013. Implementing a biometric payment system: The Andhra Pradesh experience. UC San Diego Policy Report. La Jolla: UCSD.
- g. Lewis-Faupel, Sean, Yusuf Neggars, Benjamin A. Olken, and Rohini Pande. 2016. "Can Electronic Procurement Improve Infrastructure Provision? Evidence from Public Works in India and Indonesia." American Economic Journal: Economic Policy, 8 (3): 258-83.
- h. *Aiken, EA, Bedoya, G, Blumenstock, JE, and Coville, A (2022). Program Targeting with Machine Learning and Mobile Phone Data: Evidence from an Anti-Poverty Intervention in Afghanistan, Journal of Development Economics

- i. Dodge, E., Neggers, Y., Pande, R. and Moore, C., 2021. Updating the state: Information acquisition costs and public benefit delivery. Tech. rep., EDI Working Paper Series.
 - j. Banerjee, A., Duflo, E., Imbert, C., Mathew, S. and Pande, R., 2020. E-governance, accountability, and leakage in public programs: Experimental evidence from a financial management reform in India. *American Economic Journal: Applied Economics*, 12(4), pp.39-72.
 - k. **Dzansi, J., Jensen, A., Lagakos, D. and Telli, H., 2022. Technology and tax capacity: evidence from local governments in Ghana (No. w29923). National Bureau of Economic Research.
3. Communication Infrastructure (I, II)
- Internet
- a. **Hjort, J., & Poulsen, J. (2019). The Arrival of Fast Internet and Employment in Africa. *American Economic Review*, 109(3), 1032–1079.
 - b. *Hjort, J. and Tian, L., 2021. The economic impact of internet connectivity in developing countries.
 - c. Bai, J., Chen, M.X., Liu, J., Mu, X. and Xu, D.Y., 2022. Stand Out from the Millions: Market Congestion and Information Friction on Global E-Commerce Platforms.
 - d. Goyal, A., 2010. Information, direct access to farmers, and rural market performance in central India. *American Economic Journal: Applied Economics*, 2(3), pp.22-45.
 - e. Mensah, J T, and N Traore (2023), "Infrastructure Quality and FDI Inflows: Evidence from the Arrival of High-Speed Internet in Africa," *The World Bank Economic Review*.
- Mobile Phones
- a. *Aker, Jenny C., and Isaac M. Mbiti. 2010. "Mobile Phones and Economic Development in Africa." *Journal of Economic Perspectives*, 24 (3): 207-32.
 - b. Aker, Jenny C., Christopher Ksoll, and Travis J. Lybbert. 2012. "Can Mobile Phones Improve Learning? Evidence from a Field Experiment in Niger." *American Economic Journal: Applied Economics*, 4 (4): 94-120.
 - c. Blumenstock, J., Keleher, N., Rezaee, A. and Troland, E., 2020. The impact of mobile phones: Experimental evidence from the random assignment of new cell towers. Background paper, Innovations for Poverty Action, New Haven, CT.
 - d. Jensen, R. (2007). The digital divide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *The quarterly journal of economics*, 122(3), 879-924.
 - e. **Blumenstock, J.E., Eagle, N. and Fafchamps, M., 2016. Airtime transfers and mobile communications: Evidence in the aftermath of natural disasters. *Journal of Development Economics*, 120, pp.157-181.
 - f. Dillon, B., Aker, J.C. and Blumenstock, J.E., 2020. How important is the yellow pages? experimental evidence from Tanzania.
 - g. Chi, G, Fang, S, and Blumenstock, JE (2022). Microestimates of Wealth and Poverty for all Low- and Middle-Income Countries, *Proceedings of the National Academy of Sciences*, 119(3), 1-11
 - h. Blumenstock, JE, Chi, G, and Tan, X (2023). Migration and the Value of Social Networks, *Review of Economic Studies*
4. Urban Infrastructure (I, II, III)
- a. *Gharad Bryan, Edward Glaeser, and Nick Tsivanidis (2020) *Cities in the Developing World*, *Annual Review of Economics*, Vol. 12:273-297

Urban mobility and labor markets

- a. **Tsivanidis, N., 2022. Evaluating the impact of urban transit infrastructure: Evidence from Bogota's transmilenio. Unpublished manuscript, 18.
- b. Franklin, S., Imbert, C., Abebe, G. and Mejia-Mantilla, C., 2024. Urban public works in spatial equilibrium: Experimental evidence from Ethiopia. *American Economic Review*, 114(5), pp.1382-1414.
- c. Banerjee, A.V. and Sequeira, S., 2020. Spatial mismatches and imperfect information in the job search.
- d. *Simon Franklin (2018) Location, Search Costs and Youth Unemployment: Experimental Evidence from Transport Subsidies, *Economic Journal* 128 (614), 2353-2379.
- e. Girum Abebe, Stefano Caria, Marcel Fafchamps, Paolo Falco, Simon Franklin and Simon Quinn (2020) Anonymity or Distance? Job Search and Labour Market Exclusion in a Growing African City
- f. *Glaeser, Edward L. & Kahn, Matthew E. & Rappaport, Jordan, 2008. Why do the poor live in cities: The role of public transportation, *Journal of Urban Economics*, vol. 63(1), pages 1-24.
- g. *Girija Borker (2017), Safety First: Perceived Risk of Street Harassment and Educational Choices of Women
- h. Field, Erica and Vyborny, Kate, Women's Mobility and Labor Supply: Experimental Evidence from Pakistan (April 28, 2022). Asian Development Bank Economics Working Paper Series No. 655
- i. Balboni, C., Bryan, G., Morten, M. and Siddiqi, B., 2020. Transportation, gentrification, and urban mobility: The inequality effects of place-based policies. Preliminary Draft, 3.
- j. Alba-Vivar, F., Commuting to opportunity? How transport infrastructure shapes students' college decisions in Peru.

Urban Congestion

- a. **Prottoy A. Akbar, Victor Couture, Gilles Duranton, Adam Storeygard (2021) Mobility and Congestion in Urban India, working paper.
- b. Rema Hanna, Gabriel Kreindler and Ben Olken (2017), Citywide effects of high-occupancy vehicle restrictions: Evidence from "three-in-one" in Jakarta, *Science*, Vol. 357 (6346).
- c. Amanda Ang, Peter Christensen, and Renato Vieira (2020) Should Congested Cities Reduce their Speed Limits? Evidence from Sao Paulo, Brazil
- d. Lucas Davis (2008), The Effect of Driving Restrictions on Air Quality in Mexico City, *Journal of Political Economy*, 2008, 116(1), 38-81.
- e. Yizhen Gu, Elizabeth Deakin, Ying Long (2017), The effects of driving restrictions on travel behavior: Evidence from Beijing, *Journal of Urban Economics*, Volume 102, Pages 106-122.

Slums and Urban Sprawl

- a. *Benjamin Marx, Thomas Stoker, and Tavneet Suri (2013), The Economics of Slums in the Developing World, *Journal of Economic Perspectives*, Vol. 27, No. 4 (pp. 187-210)
- b. Michael Gechter and Nick Tsivanidis (2020) Spatial Spillovers from Urban Renewal: Evidence from the Mumbai Mills Redevelopment, working paper

- c. Henderson, J.V., Regan, T. and Venables, A.J., 2021. Building the city: from slums to a modern metropolis. *The Review of Economic Studies*, 88(3), pp.1157-1192.
 - d. **Harari, M. and Wong, M., 2018, June. Slum upgrading and long-run urban development: Evidence from Indonesia. In 2018 Meeting Papers. Society for Economic Dynamics.
5. Transport and Energy Infrastructure (I, II, III)
- Rural Roads and Highways
- a. Asher, S., & Novosad, P. (2020). Rural Roads and Local Economic Development. *American Economic Review*, 110(3), 797–823.
 - b. Lorenzo Casaburi, Rachel Glennerster and Tavneet Suri (2013), Rural Roads and Intermediated Trade: Regression Discontinuity Evidence from Sierra Leone
 - c. Agarwal, S, A Mukherjee, and S L Naaraayanan (2023), "Roads and loans," *The Review of Financial Studies*, 36: 1508–1547.
 - d. Shamdasani, Y., 2021. Rural road infrastructure & agricultural production: Evidence from India. *Journal of Development Economics*, 152, p.102686.
 - e. **Faber, B., 2014. Trade integration, market size, and industrialization: evidence from China's National Trunk Highway System. *Review of Economic Studies*, 81(3), pp.1046-1070.
 - a. Abhijit Banerjee, Esther Duflo, Nancy Qian (2020) On the road: Access to transportation infrastructure and economic growth in China, *Journal of Development Economics*, Volume 145
 - b. Graff, T., 2024. Spatial inefficiencies in Africa's trade network. *Journal of Development Economics*, p.103319.
 - c. *Alder, S., 2016. Chinese roads in India: The effect of transport infrastructure on economic development. Available at SSRN 2856050.

Railways

- a. **Donaldson, D., 2018. Railroads of the Raj: Estimating the impact of transportation infrastructure. *American Economic Review*, 108(4-5), pp.899-934.
- b. Chaudhary, L. and Fenske, J., 2023. Railways, development, and literacy in India. *The Journal of Economic History*, 83(4), pp.1139-1174.
- c. Fenske, J., Kala, N. and Wei, J., 2023. Railways and cities in India. *Journal of Development Economics*, 161, p.103038.

Electricity

- a. **Burlig, F. and Preonas, L., 2016. Out of the darkness and into the light? Development effects of rural electrification.
- b. Jha, A., Preonas, L. and Burlig, F., 2022. Blackouts: The Role of India's Wholesale Electricity Market (No. w29610). National Bureau of Economic Research.
- c. Berkouwer, S.B., 2020. Electric heating and the effects of temperature on household electricity consumption in South Africa. *The Energy Journal*, 41(4), pp.209-230.
- d. *Burgess, R, M Greenstone, N Greenstone and A Sudarshan (2020), "The consequences of treating electricity as a right", *Journal of Economic Perspectives* 34(1): 145–69.
- e. Mensah, J T (2024), "Jobs! Electricity Shortages and Unemployment in Africa," *Journal of Development Economics*, 167: 103231.
- f. Nathaniel Baum-Snow, Loren Brandt, J. Vernon Henderson, Matthew A. Turner, and Qinghua Zhang (2017), *Roads, Railroads, and Decentralization of Chinese Cities*

- g. Moneke, N., 2020. Can big push infrastructure unlock development? evidence from Ethiopia. *STEG Theme*, 3, pp.14-15.
6. Infrastructure, Environment and Climate Change (I, II, III)
- Sea Level Rise and Flooding
- a. Hsiao, A., 2023. Sea level rise and urban adaptation in Jakarta. Technical Report.
 - b. *Balboni, C.A., 2019. In harm's way? infrastructure investments and the persistence of coastal cities (Doctoral dissertation, London School of Economics and Political Science).
 - c. **Gandhi, Sahil, Matthew Kahn, Rajat Kochhar, Somik Lall, and Vaidehi Tandel. Adapting to Flood Risk: Evidence from a Panel of Global Cities. NBER Working Paper No. 30137. 2022.

Air Pollution

- a. *Rema Hanna and Paulina Oliva (2015), The Effect of Pollution on Labor Supply: Evidence From a Natural Experiment in Mexico City, *Journal of Public Economics*.
- b. **Nicholas Gendron-Carrier, Marco Gonzalez-Navarro, Stefano Polloni and Matthew A. Turner (2018) Subways and urban air pollution
- c. Berkouwer, S.B. and Dean, J.T., 2023. Private actions in the presence of externalities: The health impacts of reducing air pollution peaks but not ambient exposure (No. w31614). National Bureau of Economic Research.
- d. Adhvaryu, A., Bharadwaj, P., Fenske, J., Nyshadham, A. and Stanley, R., 2019. Dust and death: evidence from the West African Harmattan (No. w25937). National Bureau of Economic Research.

Agriculture

- a. Burlig, F., Jina, A., Kelley, E.M., Lane, G.V. and Sahai, H., 2024. Long-range forecasts as climate adaptation: Experimental evidence from developing-country agriculture (No. w32173). National Bureau of Economic Research.
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