Economic Impact of Road Infrastructure in Azerbaijan.

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Outline

- Intro and background
- Country context
- Data and methodology
- Results
- Discussion of policy implications
- Conclusion

Introduction and background

- Roads are important arteries of the economy
- Most, if not all governments, prioritize and invest in infrastructure
  - It is costly

Objective: policy paper to answer

- What is the economic impact of road infrastructure (in this country)?
- How much wealth can be created (in this country)?
- How much private capital can be leveraged on to continue infrastructure investments (in this country)?

Introduction and background

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Country context

- Area: 86,600 km^2
- Population: 9,898,100
- GDP (PPP): $175 billion
- Borders: Russia, Georgia, Armenia, Iran, Caspian Sea
- Presidential Republic, since 2016
- Structure:
  - 10 economic regions;
  - 66 rayons
  - 77 cities (of which 12 major ones)
        +
 - Autonomous Republic of Nakhchivan

Country context

Economic success

- Real GDP per capita more than doubled in the past 10 years.
- Middle class increased from 4% of the population in the early 2000s to 29% by 2013.

However:

- Excessive reliance on oil exports has made it vulnerable to international economic shocks.
- Therefore, the government is now spending heavily on transport infrastructure to bolster its role as a trading link between Asia and Europe.

Country context
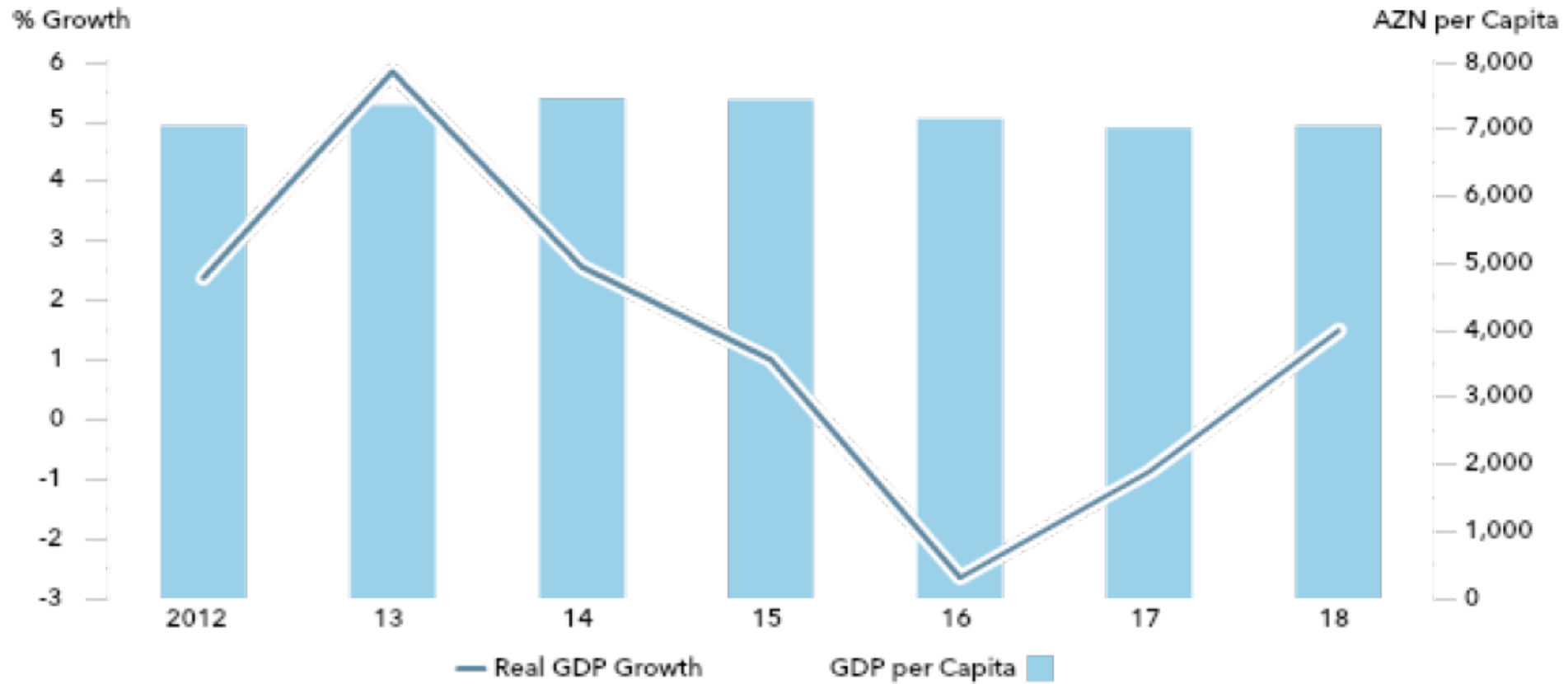
Source: Euromonitor International from national statistics/Eurostat/OECD/UN/IMF

Country context

- Huge informal sector,
  - agriculture employing 36.2% of all workers
  - ~ half of all households farm for their primary source of income
- Highly dependency on natural resources:
  - more than a third of GDP
  - over half of all fiscal revenue
  - ~ 90% of exports

Country context

- Infrastructure development is government's priority:
    - construction of pipelines to facilitate the delivery of Azeri gas to Europe beginning in 2018
    - US$3.5 billion investments in ICT over the next 10 years
    - Shah Deniz II gas field project which will see Azerbaijani gas delivered first to Turkey and then to Europe is nearing completion
    - Aim to increase the share of the non-oil sector in GDP
    - Restructuring of the financial sector to expand access to credit
    - Plan to achieve 3.3% p.a. growth rate by 2025.

Country context

- Road Network Development Program (RNDP):
  - to be implemented during 2006–2015
  - financial backing of major international donors and investors, including The World Bank, the European Bank of Reconstruction and Development (EBRD) and the Asian Development Bank (ADB)
  - due to macroeconomic volatility since the 2008 crisis, the RNDP is still ongoing in 2018

Country context

Investment Spending from State Budget in Azerbaijan, in AZN mln.
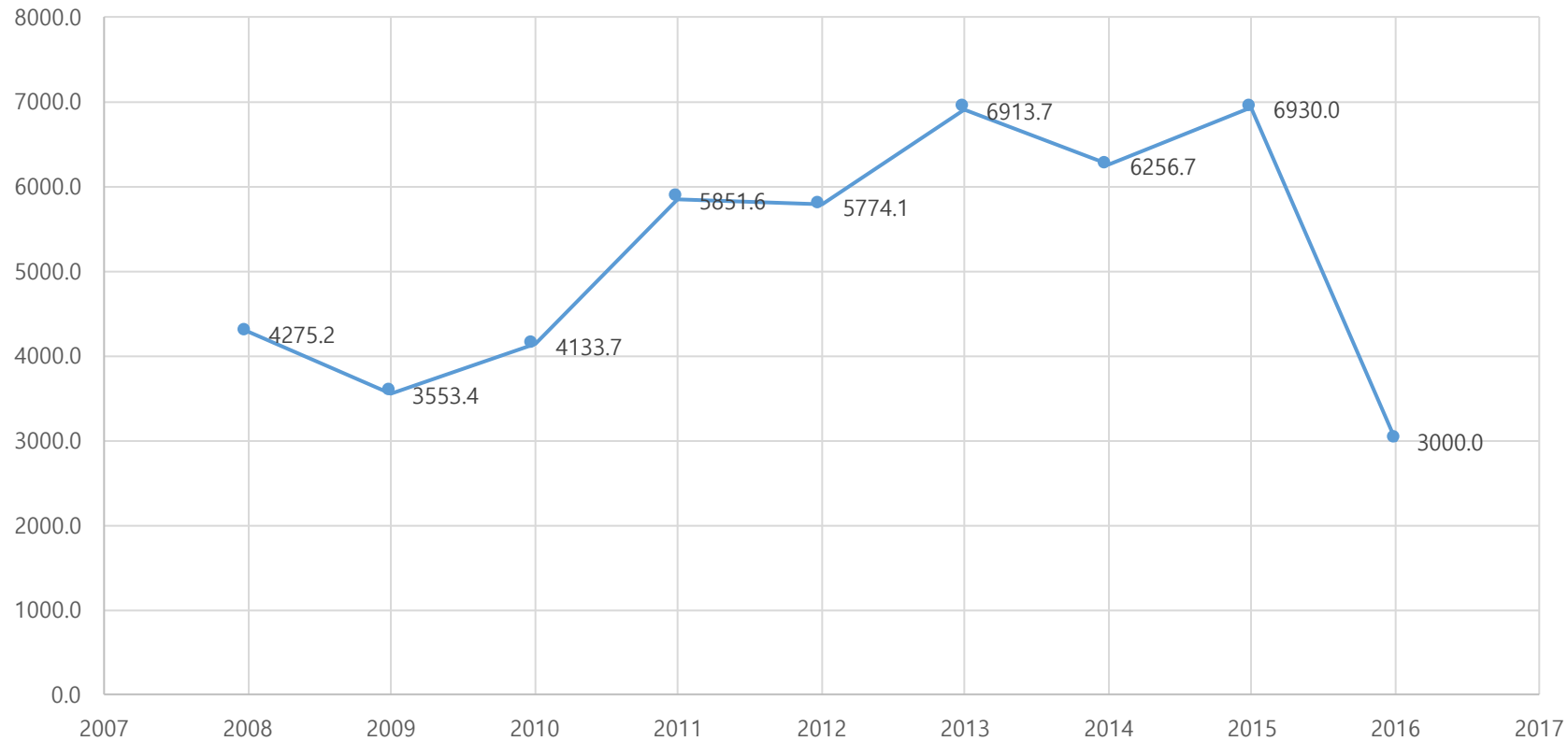
Exchange rate was USD1.24-1.27 per AZN1 for a long period until 2015. Presently, it is about USD0.6.

Data and methodology

Publicly available data:

- Azerbaijan
  - Official statistics from websites

- Cross country household & Enterprise surveys
  - WB Enterprise Survey ← Azerbaijan not included
  - EBRD's Life in Transition Survey ← 3 waves
  - USAID's Demographic & Health Survey ← only 1996
  - ADB's Household Survey on Remittances and Poverty ← 2007

Data and methodology

- None are longitudinal
- Many are not matchable (e.g. to create a panel at community level)
- Our data:
  - ADB's Household Survey on Remittances and Poverty ← RETA
  - Wave 2 and 3 of LiTS ← 2010 and 2016
  - Our own
    - district level database based on official statistics (mostly from stat.gov.az)
    - data on existence of roads at district level from RNDP reports

combined into a 2 wave district level panel

Data and methodology

- Methodology:

  - Cross-section data analysis ← short term impact

  - Difference-in-difference estimation ← longer term impact
    - Materials from ADBI
    - Most panel data econometrics textbooks (e.g. Hsiao, Wooldridge, etc.)
  - Specifications following Yoshino and Abidhadjaev (2017)
    - Unfortunately, could not obtain regional GDPs or their compositions

Results

- RETA: Likelihood of job creation by the self-employed

	(1)	(2)	(3)	(4)	(5)
Distance to road from household, km	-0.019*** (0.011)	-0.019*** (0.011)	-0.018** (0.010)	-0.014~ (0.009)	-0.043** (0.021)
Entrepreneur's age		0.001*** (0.000)	0.001* (0.000)	0.001* (0.000)	0.001** (0.000)
Entrepreneur is female				-0.031*** (0.009)	-0.027** (0.009)
Entrepreneur is married			0.020* (0.011)	0.019~ (0.011)	
Entrepreneur's education, years					0.008*** (0.002)
Household income in 2006			0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Interaction term: distance to road × entrepreneur is married					0.038* (0.21)
Obs.	2207	2184	2184	2184	2207
Pseudo R^2	0.003	0.012	0.096	0.105	0.117

Results

• District level panel: real estate values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Road treatment	52.23***	52.24***	43.35**	52.27***	53.81***	54.12***	44.97**
	(17.66)	(17.68)	(18.22)	(17.80)	(17.59)	(17.71)	(18.16)
Age		0.140	-0.130	0.149	0.501	0.602	0.521
		(2.989)	(2.985)	(3.057)	(2.974)	(3.043)	(3.035)
Female			-16.85*				-18.64**
			(8.621)				(8.680)
Married				-0.132		-1.530	-4.639
				(9.612)		(9.569)	(9.651)
University_degree					35.65***	35.75***	37.20***
					(12.48)	(12.50)	(12.49)
Constant	203.3***	202.9***	214.0***	203.0***	197.4***	198.2***	211.9***
	(4.249)	(9.516)	(11.05)	(10.83)	(9.657)	(10.90)	(12.59)
Observations	622	622	622	622	622	622	622
R-squared	0.014	0.014	0.020	0.014	0.027	0.027	0.034

Results

- District level panel: real estate values
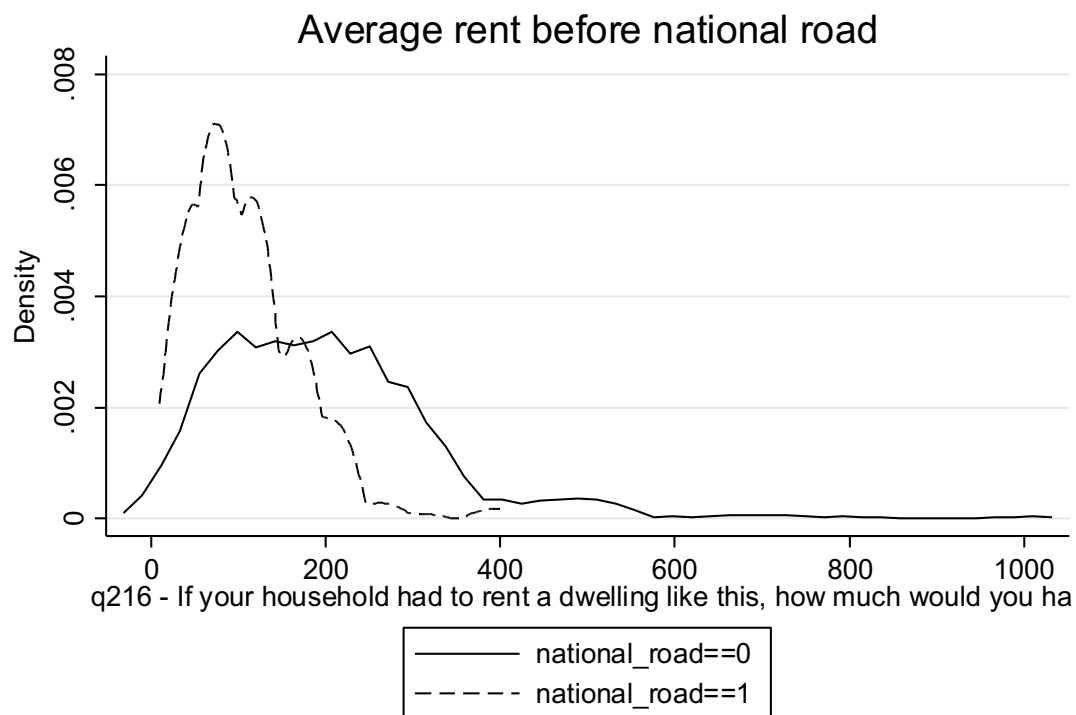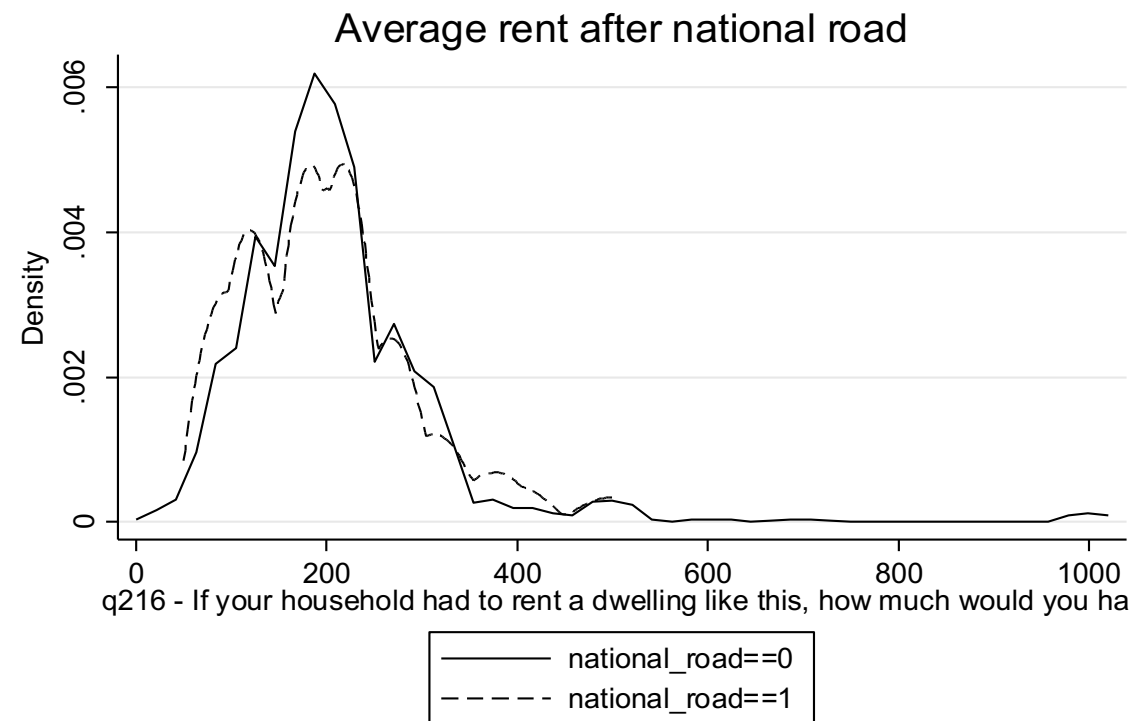
Average rent before national road

Average rent after national road

Results

• District level panel: subjective household wealth

VARIABLES	1	2	3	4	6	7	8	9	10
Road treatment	-0.0877	0.00540	-0.201	-0.188	-1.180**	-1.349*	-1.812*	-13.51	-12.31
	(0.257)	(0.255)	(0.214)	(0.233)	(0.506)	(0.707)	(0.998)	(758.9)	(570.1)
Time	0.486***	-0.00946	-0.667***	-0.0299	0.406**	0.232	-0.104	0.465	1.860***
	(0.153)	(0.168)	(0.145)	(0.145)	(0.172)	(0.215)	(0.251)	(0.462)	(0.540)
Time×treatment	0.0633	-0.228	0.115	0.0500	0.677	1.275*	0.696	-0.0172	11.28
	(0.318)	(0.359)	(0.301)	(0.298)					
Constant	-1.572***	-1.554***	-0.550***	-0.253	-0.460**	-1.655***	-1.888***	-4.024***	-4.901***
	(0.224)	(0.248)	(0.201)	(0.198)	(0.234)	(0.307)	(0.368)	(0.704)	(0.695)
Observations	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490

• Controls included for age, gender, university degree and marital status

Results

- District level panel: subjective household wealth
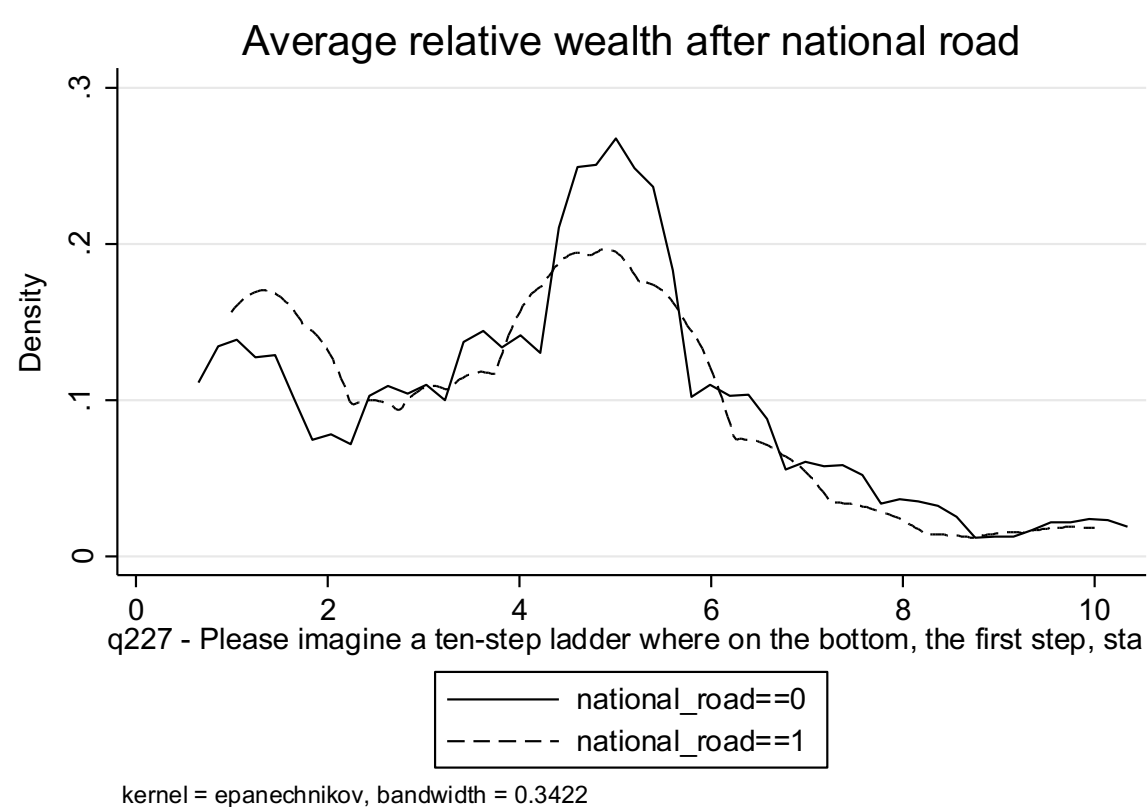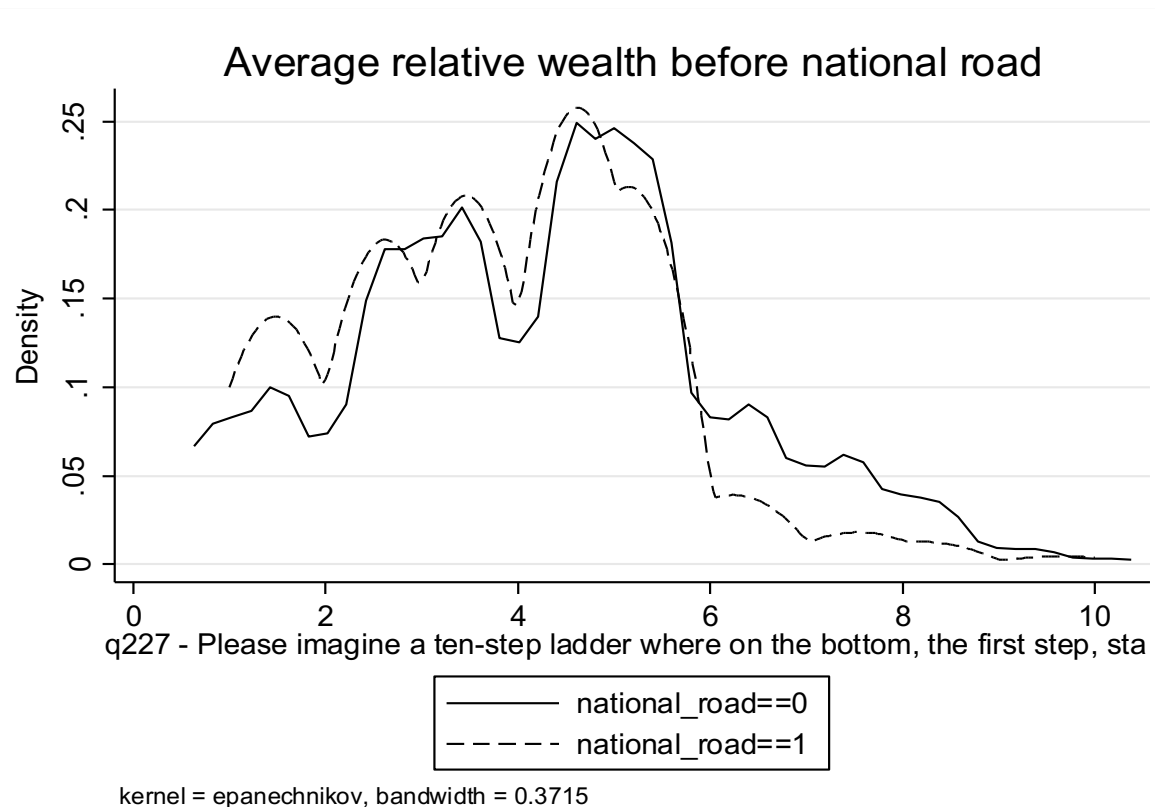
Average relative wealth before national road

kernel = epanechnikov, bandwidth = 0.3715

Average relative wealth after national road

kernel = epanechnikov, bandwidth = 0.3422

Results

- District level panel:
  - No significant results were obtained for numerous other dependent variables
  - Possible reasons:
    - Selection bias
    - Inconsistent errors
    - Overall downturn in the final years of the covered period

Results

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  - No significant results were obtained for numerous other dependent variables
  - Possible reasons:
    - Selection bias
    - Inconsistent errors ← Bertrand, Duflo and Mullainathan (2004, QJE)
    - Overall downturn in the final years of the covered period
    - Spatial variation ← 80% of the GDP in Baku

Public Finance Implications

- Real estate prices increase, creating more financial capital:
    - Increase in real estate tax revenue
    - Increase real estate developers' revenues

- Public-private partnerships
    - A lot of literature
    - Regulatory framework in Azerbaijan is only starting to be formed (as of 2017)

Public Finance Implications

- Real estate prices increase, creating more financial capital:
  - Increase in real estate tax revenue
  - Increase real estate developers' revenues

- If job creation or start-up rates increase, more additional tax revenue for the government

- Public-private partnerships
  - A lot of literature
  - Regulatory framework in Azerbaijan is only starting to be formed (as of 2017)

Thank you!

- Questions?
- Comments?