Under Pressure: High-Stakes Exams and Student Suicides in India

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Introduction

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- Suicide is one of the leading causes of death for young people aged 15–29 years (WHO, 2019).
- Reduction of suicide mortality - a global target and included as an indicator in the United Nations Sustainable Development Goals (SDGs).
- Important to understand correlates of youth suicides to design targeted and effective policies.

Motivation

- A cyclical pattern in youth suicides has been documented in high-income countries that is closely related to the school calendar (Chandler et al., 2022; Hansen & Lang, 2011; Hansen et al., 2024; Matsubayashi et al., 2016; Lahti et al., 2007).

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- LMICs account for 77 percent of global suicides (WHO, 2019).

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- Academic pressure and high-stakes testing: significant predictors of poor mental health among students, with effects ranging from anxiety, depressive symptoms, and other mental health challenges (Chen & Glaude, 2017; Cordova Olivera et al., 2023; Deb et al., 2015; Fu, 2024; Yang et al., 2023).

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- Exam-related stress is linked to physiological symptoms like gastroesophageal reflux disease (Suriyayothin et al., 2023), bruxism, headaches, and muscle pain (Medovnikova et al., 2018).

In this paper

- We use a novel dataset on geocoded monthly data on media-reported student suicides.
- We explore how hyper-competitive, high-stakes exams taken by students post-high school may be associated with youth mental health.
- The variation in the timing of high-stakes exams allows us to isolate the impact of academic stress during exam months.
- We find a robust association between high-stakes exam months and an increase in student suicides reported in the media.
- Back-of-the-envelope calculations estimate the economic burden of student suicides due to high-stakes exams at USD 1.67 billion.

High-Stakes Exams

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- Two largest, national, standardized exams – NEET (UG) and JEE-Mains.

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  - In 2024, 1,170,048 candidates appeared in the 2 sessions of JEE-Mains. 121 centrally funded technical institutes in the country that had a total of 56,548 seats; success rate less than 4.8 percent

Data

- Data extracted from the Global Database of Events, Language, and Tone (GDELT) .
- Use the text from article headlines to filter out incidents of suicides using classifications based on token terms (Dell, 2024).
- Using Google Bigquery, query all events in India since 1 January, 2017 to 30 June, 2024 that have mention of suicides and deaths caused by self-harm.
- The tokens include terms like “suicide”, “kills self”, “hangs self”, “self-immolation”, “shoots self”, “ends life”, “jumped to death”, “jumped off/from”, as well as various other tenses and verb combinations of these phrases.

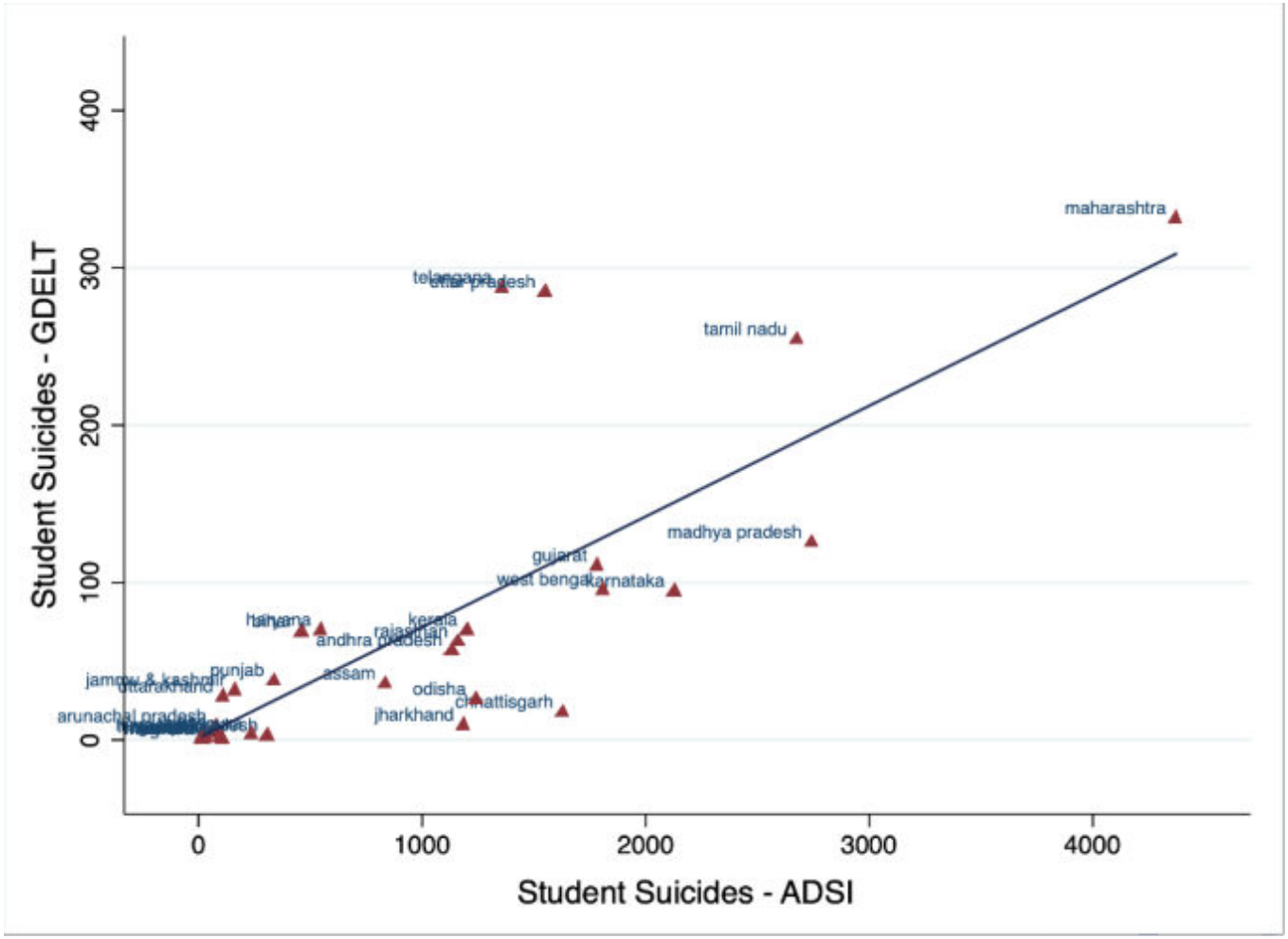
Data

- Resultant subset: media discourse surrounding suicides in India.
- Deduplicate the data points.
- Perform a content analysis: sample 1000 articles
- Identify common terms and phrases used to describe students, aspirants, adolescents, and youths.
- Filter out surrounding discourse to arrive at actual student suicides.
- 5,577 geocoded incidents of student suicides between January 1, 2017, and June 30, 2024

Data Insights

- We compare this data with official statistics on student suicides from the Accidental Deaths and Suicides in India (ADSI) reports published annually by the National Crime Records Bureau (NCRB).
- Aggregate the data from GDELT to state boundaries for each year.
  - Positive correlation between ADSI data published by NCRB and our queried data on media reported student suicides from GDELT Figure 1
  - The relative ranking of states in terms of student suicides is consistent across both the datasets. Figure 2
  - Proportion of official suicides that were done by students hovered around 7 to 8 percent. The same fraction for media reported suicides for our data is about 11.6 percent.

Aggregated student suicides across states in GDELT and ADSI



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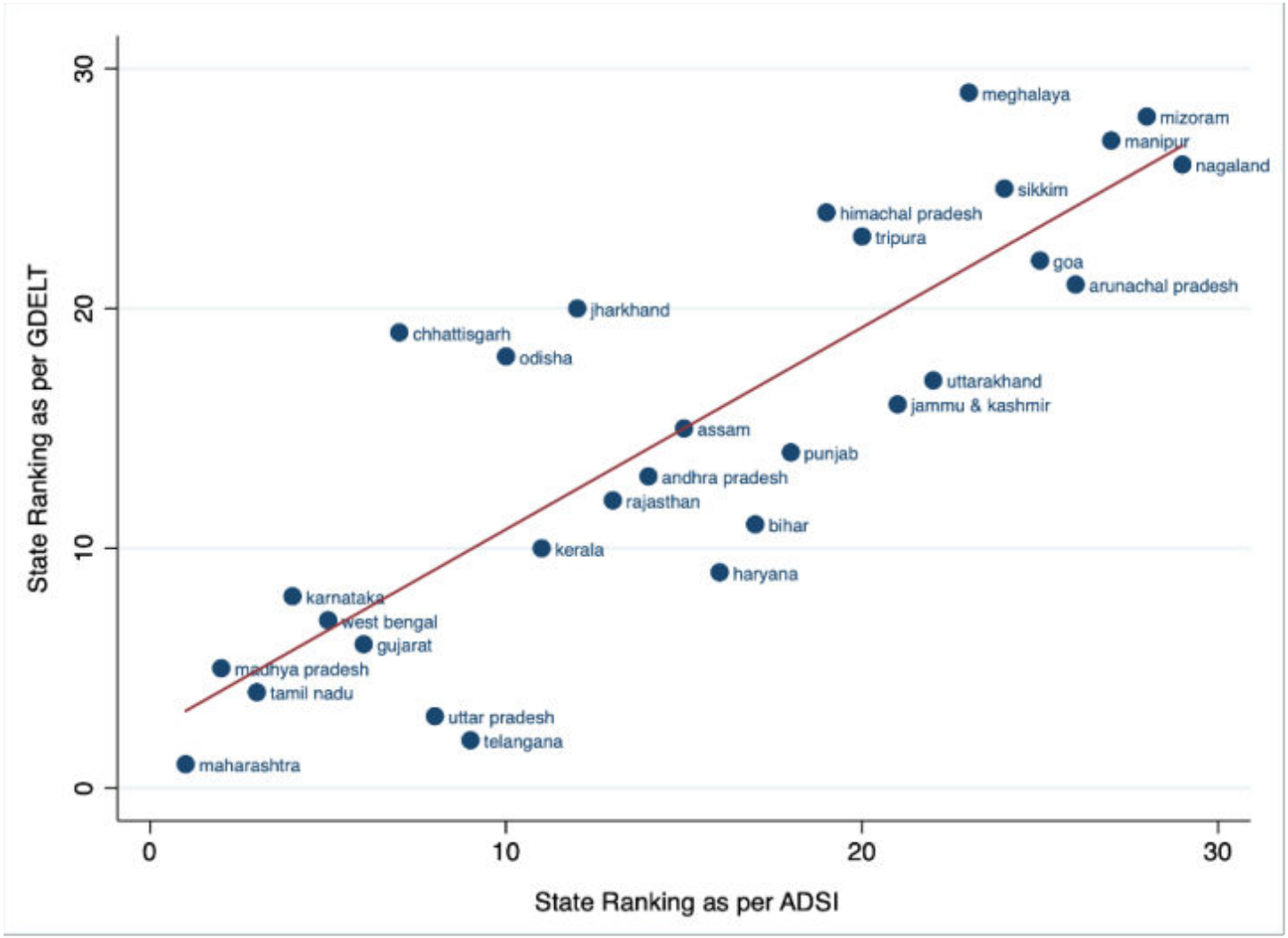
Ranking of states across GDELT and ADSI

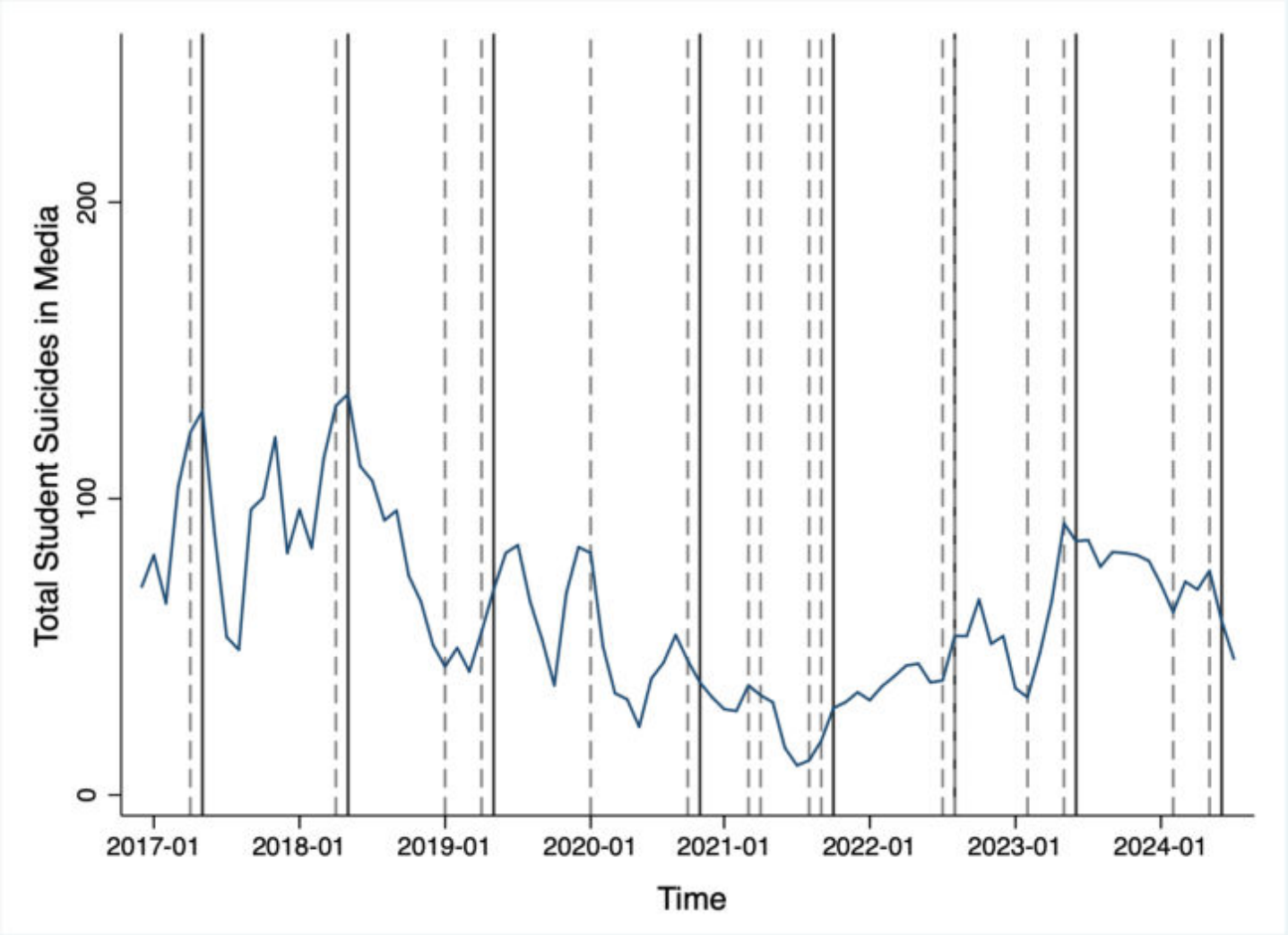


back

Some Caveats

- There are limitations to using media-reported student suicides.
- Suicide is itself underreported due to mental health stigma.
- Media attention to covering suicides may also have biases.
  - Eg: media may cover suicides in urban areas that receive more political attention.
  - Eg: due to the media's agenda-setting behavior, there could be more reporting during the same time the high-stakes exams are approaching, which can overestimate the effect of exam timing on student suicides.

Evolution of Media Coverage of Student Suicides



Regression Specification

- Mapped geocoded data on student suicides to district boundaries: panel of 641 districts over 90 months - 57,690 observations

$$Y_{dsmt} = \beta_0 + \beta_1 HighStakeExam_{mt} + \gamma_{d\times t} + \delta_{s\times m} + e_{dsmt} \quad (1)$$

- Dependent variable is the number of student suicides that were reported in media in district d of state s, month m, year t
- $HighStakeExam_{mt}$: dummy variable that equals 1 if there was a high-stakes exam conducted in month m during year t, and 0 otherwise. ▸ Table 1
- $\gamma_{d\times t}$ controls for district-specific unobservables that vary over the years that could affect incidences and reporting of student suicides; $\delta_{s\times m}$ controls for state-specific seasonality.
- standard errors clustered at the month-year level.

Results

- High-stakes exam months are associated with a 18% rise in student suicides (relative to the sample mean). ▸ main result
- Robust across:
  - Poisson and negative binomial regressions. ▸ table A1
  - Inclusion of additional covariates and fixed effects. ▸ table A2
- Heterogeneous effects:
  - Stronger impacts in states with higher baseline suicides. ▸ here
  - Heterogeneity by gender (for a subset of suicides) ▸ here ▸ here

Results

- Addressing issue of media agenda setting:
  - Subsample where media attention is expected to be lower. here
  - Use cyclone months as exogenous shocks that may shift media attention. table 3
- Falsification Checks:
  - Placebo 1: Randomly assigned pseudo-exam periods here
  - Placebo 2: Farmer suicides as outcome variable. here
- Disruptions in Exam-timing during Covid 19 here
- Oster Bounds here

Main Results

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Student Suicides						
Sample mean = 0.0963						
High-Stakes Exam	0.01827***	0.01827***	0.01827**	0.01827***	0.01734***	0.01735***
	(0.00677)	(0.00660)	(0.00811)	(0.00678)	(0.00598)	(0.00674)
Effect Size	0.189	0.189	0.189	0.189	0.180	0.180
Observations	57,690	57,690	57,690	57,690	57,690	57,690
No. of districts	641	641	641	641	641	641
Adjusted R-sq	0.0026	0.2527	0.2527	0.3206	0.3211	0.3244
Year Fixed Effects	Yes	Yes	Yes	No	No	No
District Fixed Effects	No	Yes	Yes	No	No	No
State time trends	No	No	Yes	No	No	No
District × Year Fixed Effects	No	No	No	Yes	Yes	Yes
Month Fixed Effects	No	No	No	No	Yes	No
State × Month Fixed Effects	No	No	No	No	No	Yes

back

Exogenous shocks to media attention

Outcome: Student Suicides	(1)	(2)	(3)	(4)	(5)
High-Stakes Exam	0.0191**	0.0191**	0.0191***	0.0191**	0.0173**
	(0.00894)	(0.00886)	(0.00710)	(0.00857)	(0.00746)
Cyclone Month	-0.00445	-0.00445	-0.00445	-0.00445	0.0124
	(0.00772)	(0.00675)	(0.00748)	(0.00691)	(0.01037)
High-Stakes Exam × Cyclone Month	-0.00214	-0.00214	-0.00214	-0.00215	-0.00118
	(0.0150)	(0.0145)	(0.0140)	(0.0140)	(0.0143)
Observations	57690	57690	57690	57690	57690
Year Fixed Effects	Yes	Yes	Yes	No	No
District Fixed Effects	No	Yes	Yes	No	No
State time trends	No	No	Yes	No	No
District × Year Fixed Effects	No	No	No	Yes	Yes
State × Month Fixed Effects	No	No	No	No	Yes

back

Heterogeneity

	(1) Hindi Belt	(2) Below Hindi Belt	(3) North East	(4) Dropping Union territories	(5) High Student Suicide States
High-Stakes Exam	0.0141**	0.0447**	0.0091**	0.0210***	0.0383***
	(0.00579)	(0.0200)	(0.0043)	(0.0069)	(0.0144)
Sample Mean	0.064	0.203	0.013	0.091	0.136
Effect size	0.220	0.220	0.70	0.230	0.281
Observations	25,200	8,910	7,380	53,730	19,620

back

Heterogeneity

Panel A	(1) Student suicides by girls	(2) Student suicides by boys	(3) Combined student suicides
High-Stakes Exam	0.0034***	0.0058*	0.0093***
	(0.0012)	(0.0032)	(0.0031)
Effect Size	0.327	0.1388	0.1781
Observations	57,690	57,690	57,690
Panel B			
Only NEET	0.0078***	0.0047	0.0126**
	(0.0023)	(0.0055)	(0.0058)
Effect Size	0.327	0.1388	0.1781
Observations	57,690	57,690	57,690
Panel C			
Only JEE-Mains	0.0016	0.0060*	0.0077**
	(0.0015)	(0.0037)	(0.0033)
Effect Size	0.153	0.1438	0.147
Observations	57,690	57,690	57,690

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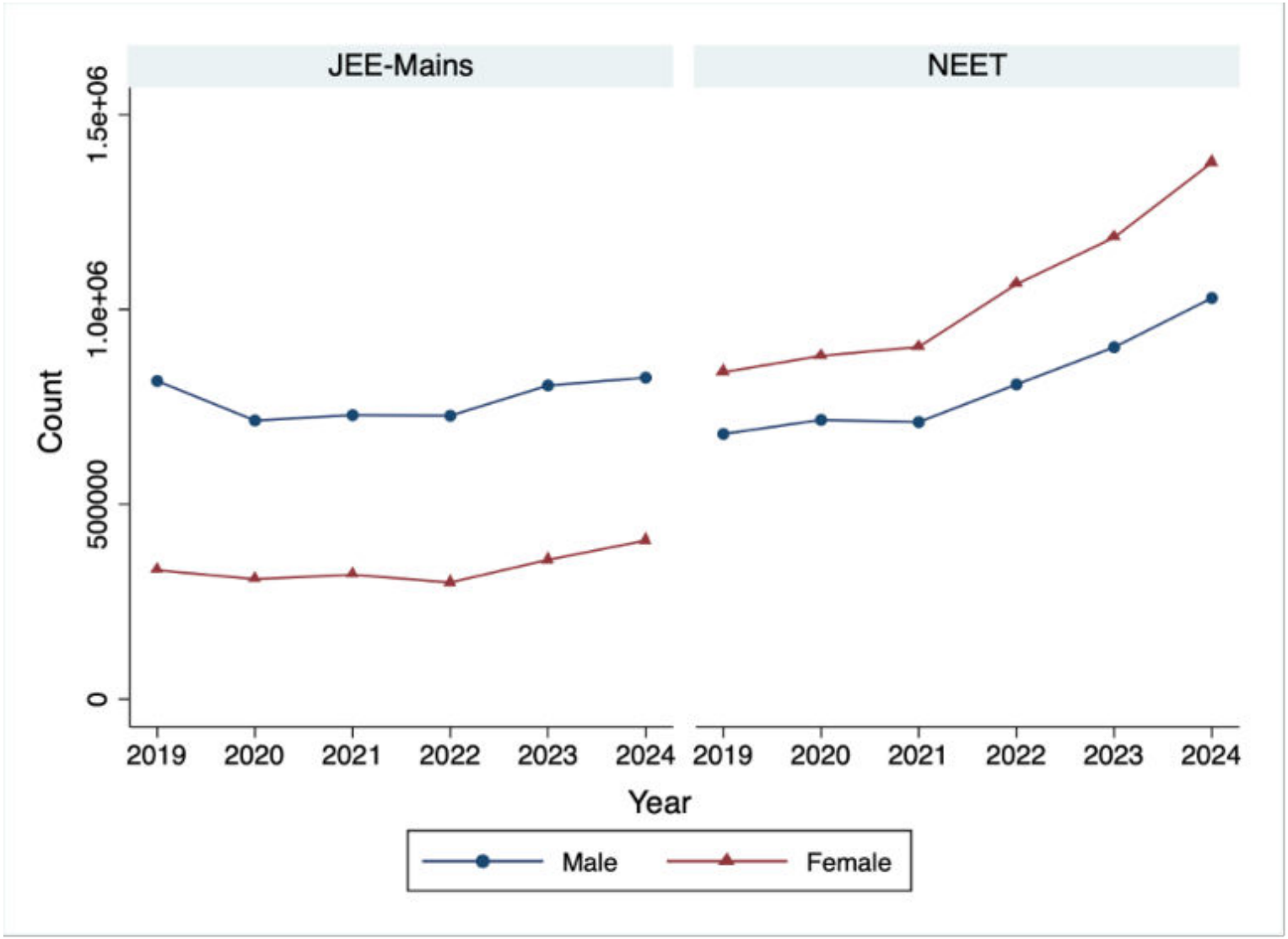

JEE-Mains
NEET
Count
0
500000
1.0e+06
1.5e+06
2019
2020
2021
2022
2023
2024
Year
Male
Female

back

Falsification Tests

Panel A: Placebo 1					
Outcome: Student Suicides	(1)	(2)	(3)	(4)	(5)
Pseudo Exam	0.00411	0.000660	0.000639	0.00157	0.0007
	(0.00628)	(0.00509)	(0.00544)	(0.00546)	(0.00583)
Observations	57690	57690	57690	57690	57690
Panel B: Placebo 2					
Outcome: Farmer Suicides	(1)	(2)	(3)	(4)	(5)
High-Stakes Exam	-0.000495	-0.000495	-0.000495	-0.000495	-0.0003
	(0.00378)	(0.00343)	(0.00413)	(0.00375)	(0.00308)
Observations	57690	57690	57690	57690	57690
Year Fixed Effects	Yes	Yes	Yes	No	No
District Fixed Effects	No	Yes	Yes	No	No
State time trends	No	No	Yes	No	No
District × Year Fixed Effects	No	No	No	Yes	Yes
State × Month Fixed Effects	No	No	No	No	Yes

back

Disruptions in Exam-timing during Covid 19

	(1)	(2)	(3)	(4)
Outcome: Student Suicides				
High-Stakes Exam	0.01735***	0.022974**		
	(0.00674)	(0.00975)		
Only NEET			0.02624***	
			(0.01011)	
Only JEE-Mains				0.01625**
				(0.00636)
Effect Size	0.180	0.202	0.272	0.168
Observations	57,690	42,306	57,690	57,690
No. of districts	641	641	641	641
Adjusted R-sq	0.3244	0.3297	0.3244	0.3890
District × Year Fixed Effects	Yes	Yes	Yes	Yes
State × Month Fixed Effects	Yes	Yes	Yes	Yes
Sample	Full	Covid-19 years dropped	Full	Full

back

Oster Bounds

			$R^2_{max} = \min(1.3R^2_{controls}, 1)$		
Dependent variable: Student Suicides Reported in Media	(1) No Controls	(2) Controls	(3) δ for $\beta = 0$	(4) β for $\delta = 1$	(5) Oster's bound, $\delta = 1$
High-Stakes Exam	0.0089	0.0173***	-12.07	0.0192	[0.0173, 0.0192]
	(0.0080)	(0.006)			
R^2	0.000	0.123			

back

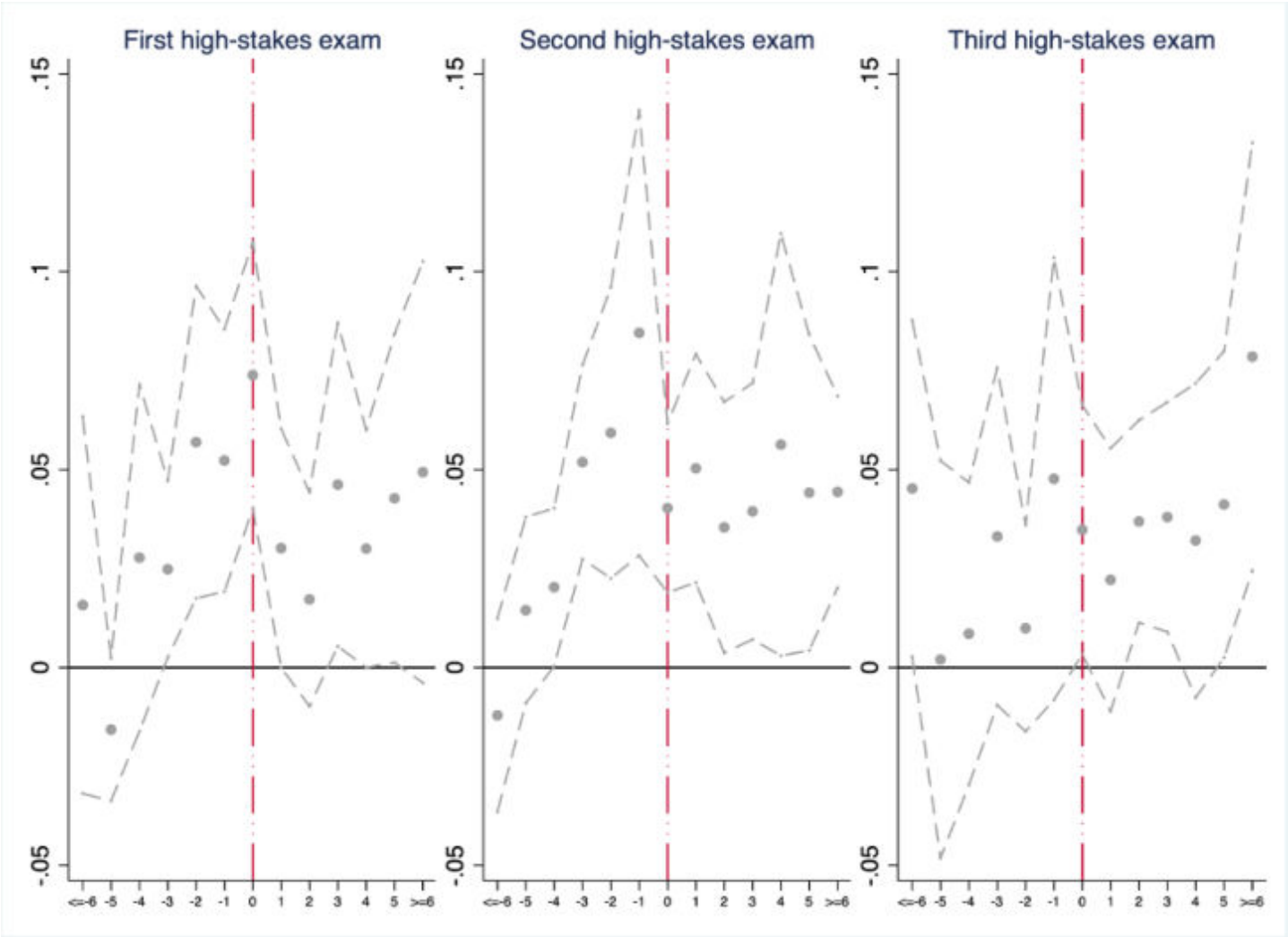
Back of the Envelope Calculations

- The total national economic burden of suicides was estimated to be USD 16.75 billion in 2019 (Nigam et al., 2019).
- In 2019, there were approximately 10,335 student suicides, which implies an **economic burden per student suicide of around USD 119,932**.
- If we assume high-stakes exam months contributed to an 18% rise in student suicides in 2019: **1,860 excess suicides**, translating into a total economic cost of **USD 223 million**.
- The cumulative economic burden of student suicides attributed to high-stakes exam pressure would be approximately **USD 1.67 billion**.
- The economic cost of these student suicides would represent about **0.08% of India's real GDP** (India's real GDP at constant prices for 2023-2024 was estimated at USD 2.07 trillion).

Potential Mechanisms

- Academic stress:
  - Leads and lags analysis: suicides increase in pre-exam months. ▸ figure
- Stronger association between high-stakes exams and student suicides in areas with more intense concentration of exam-related pressures
  - Greater effects in urbanized areas - greater number of takers, higher career returns, concentration of exam centers. ▸ here
  - Rule out possibility of reporting bias towards urban areas.

Mechanisms



back

Mechanisms

	Travel time to nearest city		Distance to roads		Night-time lights	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
Panel A						
High-stakes Exam	0.0313***	0.0046	0.0294***	0.0064	0.0023	0.0335***
	(0.011)	(0.006)	(0.008)	(0.005)	(0.002)	(0.009)
Observations	26,544	26,460	26,544	26,460	26,460	26,544
Panel B						
Board Exam	0.0108	0.0073	0.0077	0.0104	0.0024	0.0157
	(0.010)	(0.006)	(0.011)	(0.006)	(0.003)	(0.011)
Observations	28,440	28,350	28,440	28,350	28,350	28,440

back

Conclusion

- High-stakes exam months are associated with an increase in student suicides reported in the media.
- Findings emphasize the need for:
  - Mental health support.
  - Education policy reforms.
  - Cultural shift in career aspirations.

Questions?

Thank you!

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Distribution of high-stakes exams over years

Calendar Year	Joint Entrance Examination (JEE) Months	National Eligibility cum Entrance Test (NEET) Months
2017	April	May
2018	April	May
2019	January, April	May
2020	January, September	October
2021	February, March, July, August	September
2022	June, July	July
2023	January, April	May
2024	January, April	May

back

Poisson and Negative Binomial Regressions

	(1) Poisson IRR	(2) Negative Binomial IRR
Outcome: Count of Student Suicides		
High-Stakes Exam	1.150**	1.183***
	(0.0772)	(0.0744)
Observations	57,690	57,690

back

Additional Controls

	(1)	(2)	(3)	(4)	(5)
Outcome: Student Suicides					
Sample Mean = 0.083					
High-Stakes Exam	0.0207***	0.0182***	0.0182***	0.0185***	0.0180***
	(0.0065)	(0.0049)	(0.0064)	(0.0053)	(0.0061)
Observations	51156	51156	51156	51136	51136
District × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	No	Yes	No	No	No
State × Month Fixed Effects	No	No	Yes	Yes	Yes
Average Temperature	No	No	No	Yes	Yes
Average Precipitation	No	No	No	No	Yes

back

Dropping big cities and towns

	(1)	(2)	(3)	(4)	(5)
Outcome: Student Suicides					
Sample Mean = 0.060					
High-Stakes Exam	0.0133**	0.0133**	0.0133*	0.0133*	0.0114*
	(0.00660)	(0.00661)	(0.00672)	(0.00700)	(0.00606)
Observations	55,350	55,350	55,350	55,350	55,350
Year Fixed Effects	Yes	Yes	Yes	No	No
District Fixed Effects	No	Yes	Yes	No	No
State time trends	No	No	Yes	No	No
District × Year Fixed Effects	No	No	No	Yes	Yes
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back

Gender Analysis: Poisson and Negative Binomial Regressions

	(1)	(2)	(3)
Panel A: Poisson Regression	Student suicides by girls	Student suicides by boys	Combined student suicides
High-Stakes Exam – IRR	1.3579**	1.1170	1.1622**
	(0.1681)	(0.0947)	(0.0822)
Observations	57,690	57,690	57,690
Panel B: Negative Binomial Regression	(1) Student suicides by girls	(2) Student suicides by boys	(3) Combined student suicides
High-Stakes Exam – IRR	1.4641***	1.1222	1.1940***
	(0.1768)	(0.0855)	(0.0789)
Observations	57,690	57,690	57,690