Building a Wall Around Science: The Effect of US-China Tensions on International Scientific Research

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Science has become extremely international

- **Training**: ~40% of STEM PhDs in the US are foreign born (NSF)
- **Retention:** 77% of U.S. STEM PhDs remained in the US 2001-2015 (Corigan et al 2022)
- **Knowledge**: significant portion of US papers cite foreign-produced science (and vice versa)
    - Diffusion of knowledge and ideas driven in part by diaspora networks and migration (Miguelez 2008; Kerr 2008; Oettl and Agrawal 2008)
- **Productivity**: 40% of U.S. pubs produced by cross-border teams (NSF)

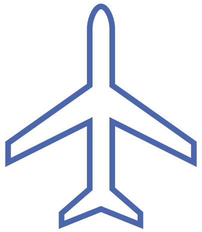
US-China relationship particularly important

- **Training**: ~40% of U.S. STEM PhDs in the US are foreign born (NSF)
    - 1/3 of foreign born are from China
- **Retention:** 77% of U.S. STEM PhDs remained in the US 2001-2015 (Corigan et al 2022)
- **Knowledge**: significant portion of US papers cite foreign-produced science
- **Productivity**: 40% of U.S. pubs produced by cross-border teams (NSF)
    - 25% of US STEM pubs have at least one China-based coauthor

Since 2016, the U.S.-China relationship has deteriorated rapidly, with a series of formal anti-Chinese policies implemented in the U.S. in 2018…

- 1st Trump campaign (2015-16): anti-China rhetoric
  - *"There are people who wish I wouldn't refer to China as our enemy. But that's exactly what they are."*
- In 2018:
  - US-China Trade War
  - China Initiative launched to investigate (typically) Chinese and Chinese-American scientists under suspicion of IP theft on behalf of the Chinese government
  - State Department imposed new restrictions limiting the duration of F-1 visas for Chinese students in sensitive STEM fields

In this paper, we examine the impact of rising US-China tensions on three dimensions of science



Trainee mobility

(enrollment & retention)

International knowledge flows

Scientist productivity

An overview of our approach

- **Diff-in-Diff** exploiting rise in US-China tensions
  - Before and after 2016
  - Not a sharp treatment date – always have event studies
  - Groups targeted vs control group
- **Two data sources:**
  - Digital CVs of STEM trainees from ORCID
  - Bibliometric data on STEM publications and teams from Dimensions

- **Six outcomes:**
  - Ethnically Chinese PhD **enrollment** location (US vs not)
  - **Retention** of ethnically Chinese post-PhD in US
  - **Knowledge flows** US→China
  - **Knowledge flows** China→US
  - **Productivity** of China-based scientists who rely on US science
  - **Productivity** of ethnically Chinese scientists in the US

Builds on research on the impact of international conflict on science

- WWI/WWII (e.g., Iaria et al 2018; Moser et al 2014; Waldinger 2010)
- Russian invasion of Ukraine: (Ganguli and Waldinger 2023)
- U.S.-China tensions:
  - Aghion et al 2023: find a negative effect of the China Initiative on the quality of research produced by scientists in China
  - Jia et al 2023: find a negative effect of the China Initiative on productivity of U.S. biology scientists who had collaborators in China
- Our contributions:
  - Even geopolitical tensions at a much lower level than the formal expulsion of academics or violent warfare can lead to a significant shift in scientist mobility, knowledge flows, and productivity
  - Asymmetric effects across the US and China
  - Ambient geopolitical hostility alone can meaningfully disrupt global science
  - Negative sentiment and perceived risk can reshape where scientists choose to study, work, and publish— even in the absence of direct restrictions.

Part 1: Trainee Mobility

How do US-China tensions affect the locations in which ethnically Chinese PhD students are trained (enrollment) and work after graduating (retention)?

Enrollment: How do U.S.-China tensions affect where ethnically Chinese PhD students study?

- **Data** = ORCID CVs of STEM students
  - Sample = students beginning STEM PhDs anywhere in the world between 2008-2019

- **DV** = 1{enrolls in US graduate program}
- **Treat** = 1{ethnically Chinese}
  - "ethnically Chinese" defined by name algorithm
- **Controls** = Cohort, prior degree country, field FEs

Enrollment: We find that ethnically Chinese individuals become 15% less likely to do their PhD in the US after 2016

- **Data** = ORCID CVs of STEM students
  - Sample = students beginning STEM PhDs anywhere in the world between 2008-2019
- **DV** = 1{enrolls in US graduate program}
- **Treat** = 1{ethnically Chinese}
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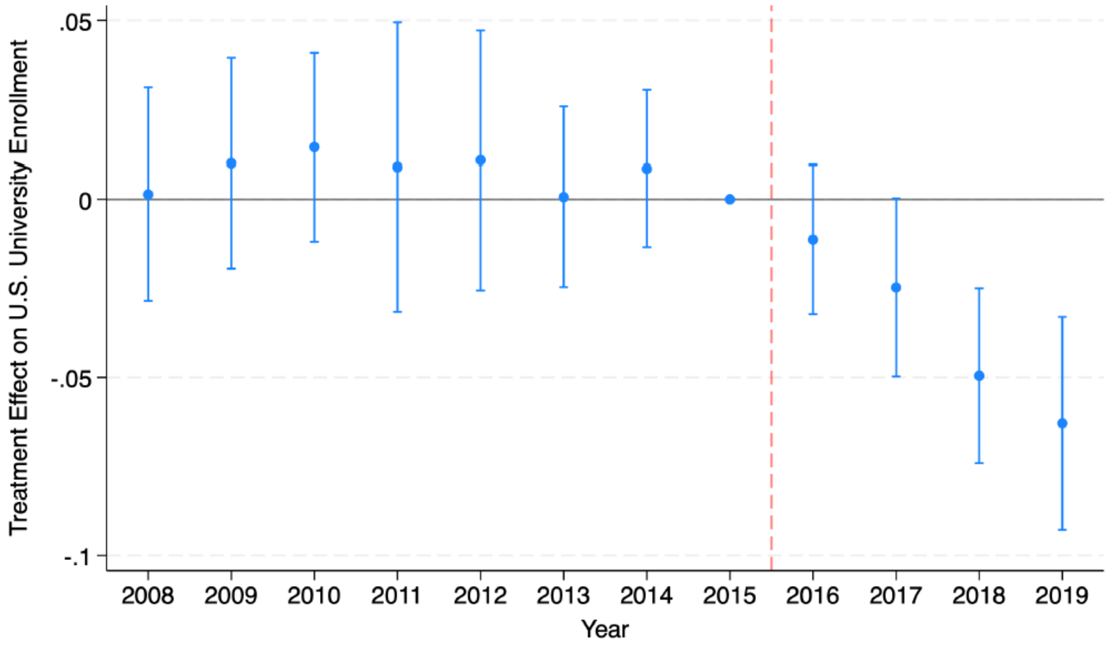
- **Controls** = Cohort, prior degree country, field FEs

Figure 3: Event Study for Propensity to Enroll in a U.S. University



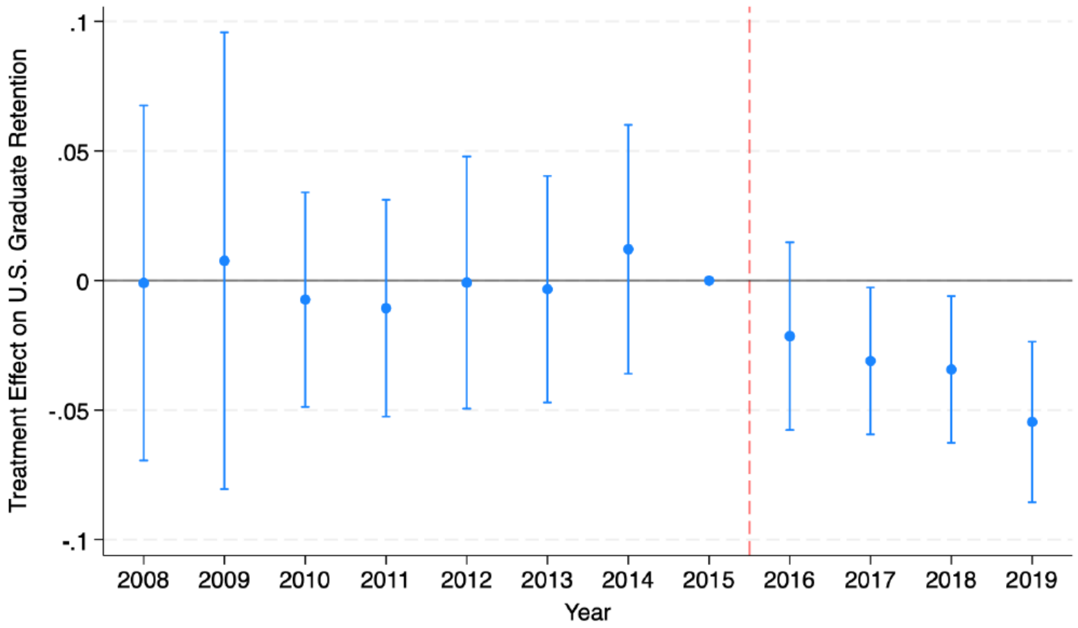
Notes: This plot reports event-study coefficients from a regression predicting enrollment in a U.S. university. The treated group is ethnically Chinese doctoral students, and the control group is non-ethnically Chinese doctoral students. The regression includes cohort, prior degree country, and field fixed effects. Standard errors are clustered at the field-year level.

Retention: We find that ethnically Chinese graduates become 4% less likely to stay in the U.S. post-graduation

- **Data** = ORCID CVs of STEM students
  - Sample = those graduating after 2005, took a job 2009-2019

- **DV** = 1{job in U.S.}
- **Treat** = 1{ethnically Chinese}
- **Controls** = cohort and field FEs

Figure 4: Event Study for Likelihood of U.S. Retention



Notes: This plot reports event-study coefficients from a regression predicting whether post-graduation jobs remain in the U.S. The treated group is ethnically Chinese U.S. graduates, and the control group is non-ethnically Chinese U.S. graduates. The regression includes cohort and field fixed effects. Standard errors are clustered at the field-year level.

Summary: US-China tensions impact on trainee mobility

- Ethnically Chinese trainees become:
  - 15% less likely to go to the US for their PhD
  - 4% less likely to stay in the US post-PhD

- Largest effects around highest quality Chinese students
- Go to other Anglophone countries instead

Part 2: Cross-border knowledge diffusion

How do US-China tensions affect knowledge diffusion (citations) between the two countries? Do we see scientific decoupling?

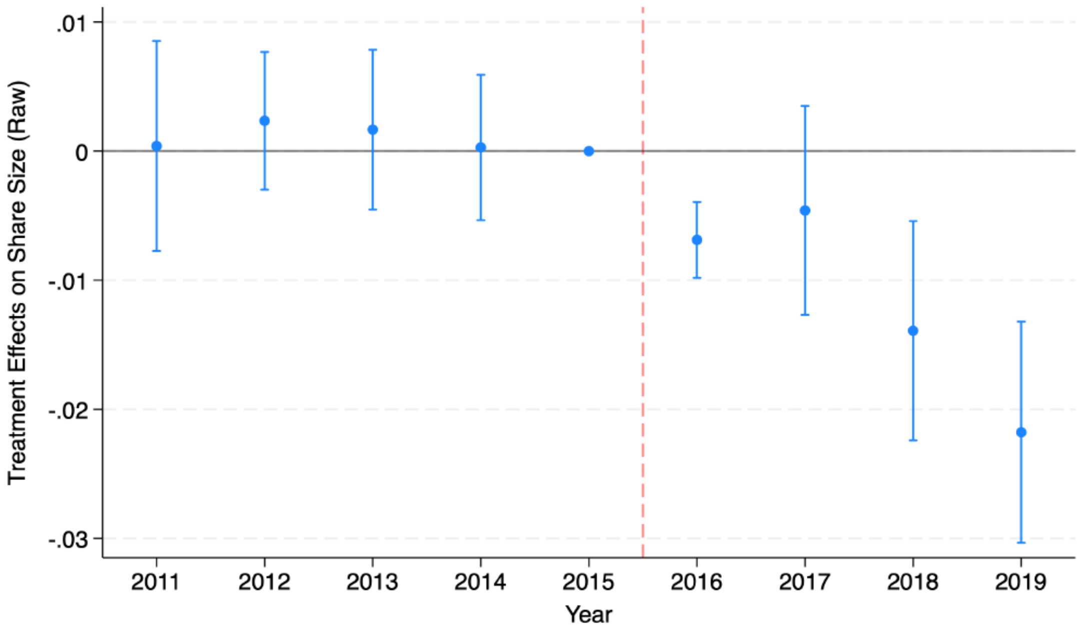
U.S.→CN knowledge diffusion: Dimensions data

- Data:
  - Papers written by China-based research teams, 2011-2019
    - China-based research team: author addresses are all in mainland China
  - For each paper, create two observations: share of citations to U.S. and share of citations to the U.K.
- DiD Approach (Iaria et al 2018)
  - Share of cites to U.S. (treated)
  - Share of cites to U.K. (control)
  - Controls: Citing paper FE
  - Why this approach? Separating our effect from the general trend in Chinese researchers relying less on non-Chinese research.

We find that Chinese publications shifted away from referencing papers from the U.S.

- Data:
  - Dimensions papers written by China-based scientists, 2011-2019
  - For each paper, create two observations: citations to U.S. and citations to the U.K.
- DiD Approach (Iaria et al 2018)
  - Share of cites to U.S. (treated)
  - Share of cites to U.K. (control)
  - Controls: Citing paper FE

Figure 5: Event Study for Chinese Researchers Building on U.S. Science



Notes: This plot reports event-study coefficients from a regression predicting the unadjusted size of reference shares on Chinese papers. The treated group is reference shares citing the U.S., and the control group is reference shares citing the U.K. The regressions include fixed effects for the citing paper. Standard errors are clustered at the field level.

Strongest effects for recent frontier publications

- Data:
    - Dimensions papers written by Chinese scientists, 2011-2019
    - For each paper, create two observations: citations to U.S. and citations to the U.K.
- Approach (Iaria et al 2018)
    - Share of cites to U.S. (treated)
    - Share of cites to U.K. (control)
    - Controls: Citing paper FE
- "frontier" = citations to research in top 1% of its field's citation distribution
- "recent" = last five years

	Raw	Recent Frontier
Treat = citing U.S. x Post	-0.0139***	-0.0321***
	(0.00438)	(0.00552)
Citing Paper FE	Y	Y
N	4247176	2309406
Mean DV	0.126	0.162
Model	OLS	OLS

CN→U.S. knowledge diffusion: Dimensions data

- Data:
  - Dimensions papers written by U.S. or U.K. research teams, 2011-2019
    - Either all author addresses are U.S. or all author addresses are U.K.

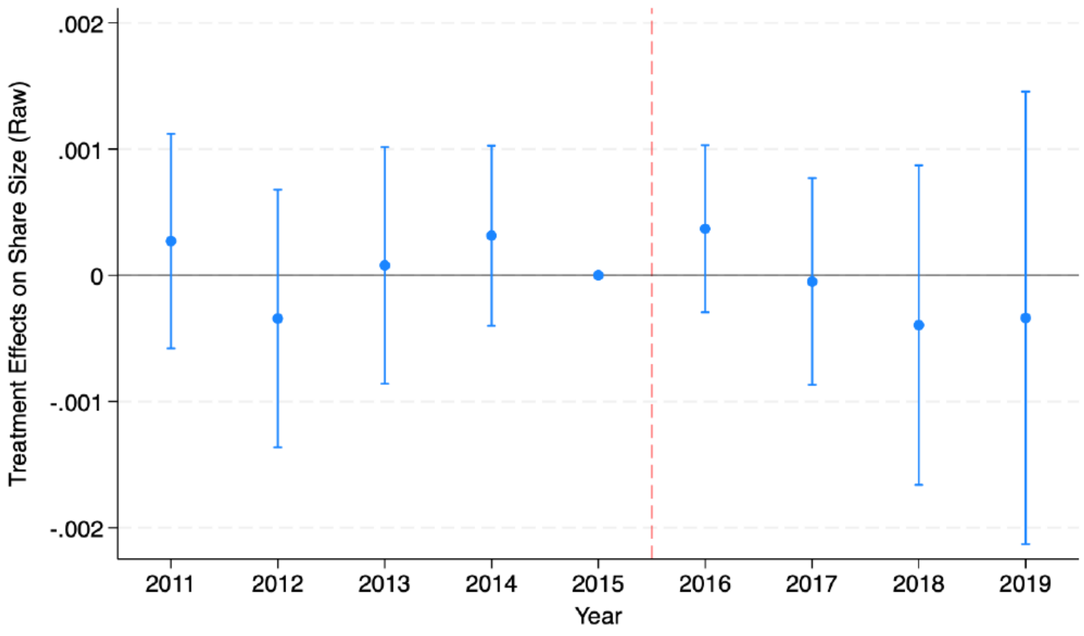
- DiD Approach (Traditional)
  - DV = Share of cites to Chinese publications
  - U.S. publications (treated)
  - U.K. publications (control)
  - Controls: Publication field, publication year FEs
  - Why back to traditional approach? Hard to find a plausible counterfactual to China

We find no such effect on U.S. usage of Chinese science

- Data:
  - Dimensions papers written by U.S. or U.K. scientists, 2011-2019

- Approach:
  - DV: Share of cites to Chinese publications
  - Treated group: Focal paper by U.S. authors
  - Control group: Focal paper by U.K. authors
  - Controls: publication year & field FE

Figure 6: Event Study for U.S. Researchers Building on Chinese Science



Notes: This plot reports event-study coefficients from a regression predicting the unadjusted share of references citing Chinese research using U.S. and U.K. publications. The treated group is U.S. papers, and the control group is U.K. papers. The regressions include fixed effects for publication years and research fields. Standard errors are clustered at the field level.

Summary: US-China tensions impact on cross-border knowledge flows

- Evidence of some asymmetry:
  - Significant reduced knowledge flows US→CN
    - Recent frontier papers in the US especially less likely to be cited, consistent with story of knowledge not flowing
  - No decline in CN→US knowledge flows

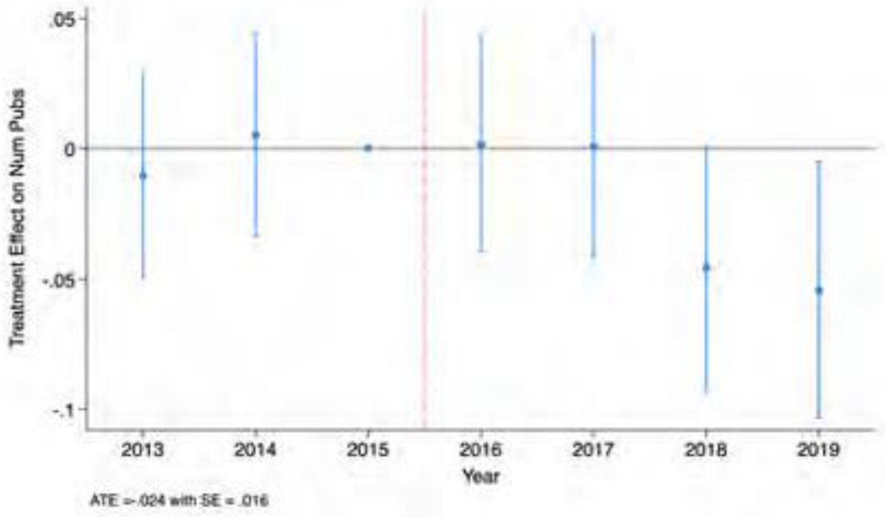
- Results may be conservative given lags in the publication process

Part 3: Productivity

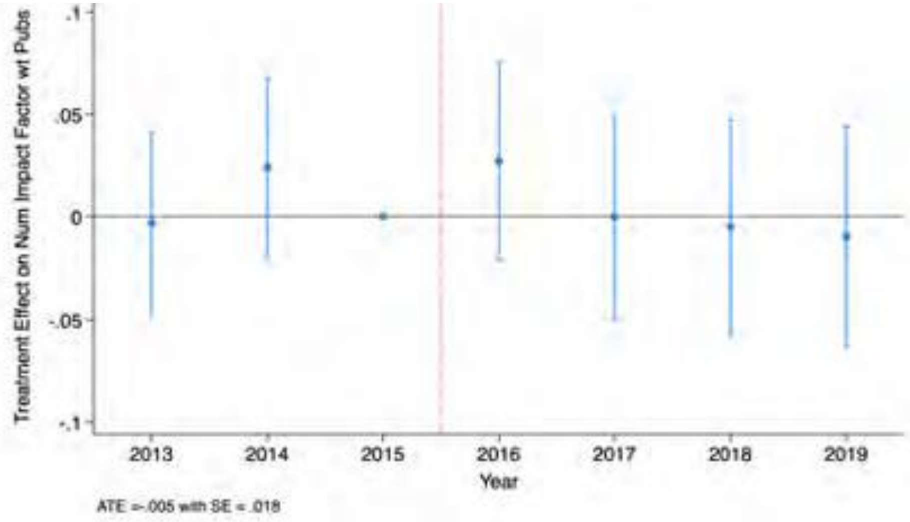
How do US-China tensions affect scientist productivity (# of papers) in each country?

We do not see any negative effect on the productivity of China-based scholars who heavily used U.S. sources

- Data:
  - Dimensions, panel of active China-based researchers (>5 papers 2008-2012, >1 paper 2013-2019)
- Approach
  - Poisson DiD
  - Treated group: CN researchers who heavily use U.S. sources
  - Control group: CN researchers who heavily use U.K. sources
  - Coarsened Exact Matching



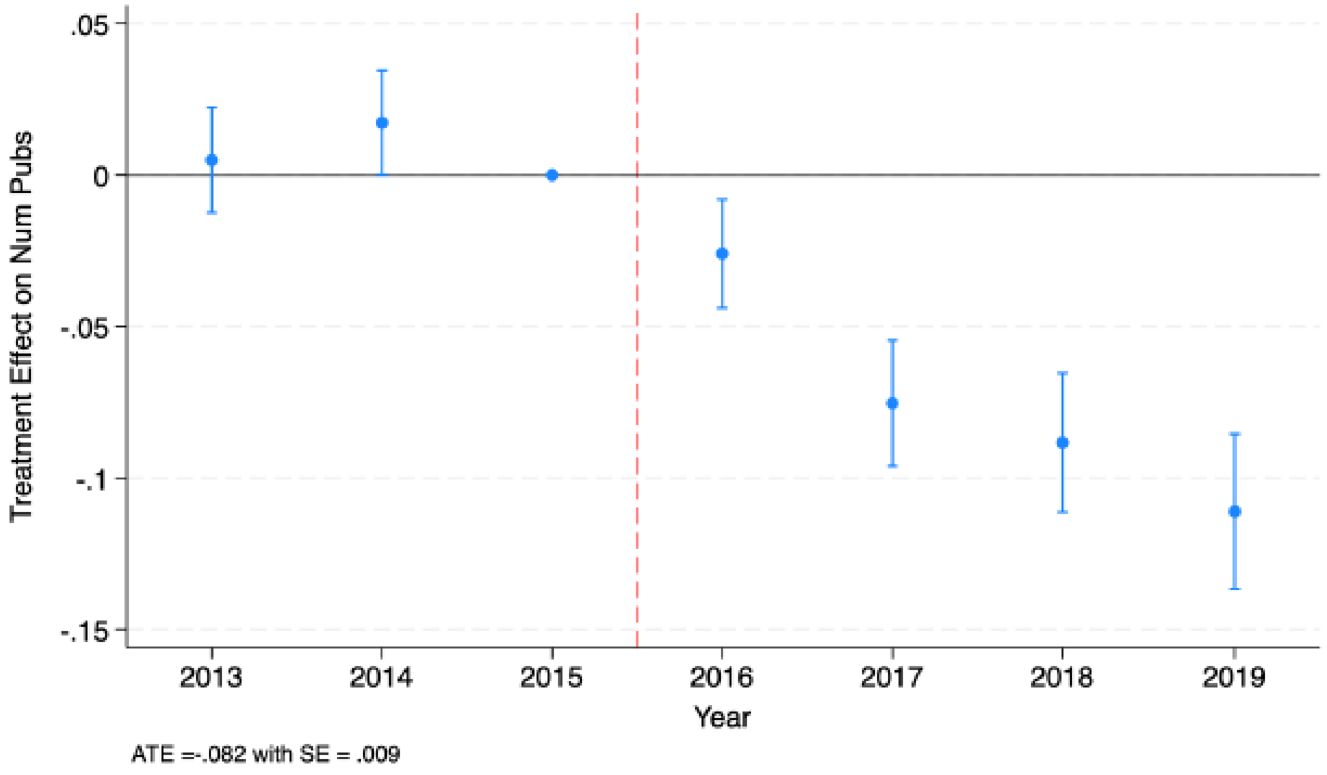
(a) DV: Pubs



(b) DV: IF wt Pubs

But ethnically Chinese researchers in the U.S. experience an 8-11% productivity decline

- Data:
  - Dimensions, panel of active U.S.-based researchers
- Approach
  - Poisson DiD
  - Treated group: ethnically Chinese researchers in the U.S.
  - Control group: non-ethnically Chinese researchers in the U.S.
  - Coarsened Exact Matching



Summary: US-China tensions impact on productivity

- Evidence of asymmetry again:
  - No negative effect on productivity of China-based researchers
  - 8-11% drop in productivity of ethnically Chinese researchers in the U.S.

- Strong enough negative effects on ethnically Chinese researchers that some stop producing altogether (10% increase in the hazard of stopping publishing altogether)

Disentangling the mechanism

Moving beyond the “bundled” treatment

We argue that our results are consistent with a chilling effect on ethnically Chinese students and scientists in the U.S.

- Atmosphere of fear, discomfort, and perceived hostility
- Operating not through formal exclusion, but through anticipatory self-selection and disengagement
- May reflect perceptions of anti-Chinese sentiment, not necessarily actual hostility
- Will outline five categories of evidence consistent with this explanation

Evidence of a chilling effect

1. Timing: Our effects begin to emerge in 2016, although formal policies didn't come until 2018 (China Initiative, US-China Trade War, Chinese visa restrictions)
2. Survey results suggest high levels of fear and uncertainty among ethnically Chinese scientists in the US
3. No increase in visa denials in 2016 for Chinese nationals relative to other international students

Evidence of a chilling effect

1. Timing: Our effects begin to emerge in 2016, although formal policies didn't come until 2018 (China Initiative, US-China Trade War, Chinese visa restrictions)
2. Survey results suggest high levels of fear and uncertainty among ethnically Chinese scientists in the US
3. No increase in visa denials in 2016 for Chinese nationals relative to other international students
4. **Effects extend beyond those directly targeted…(those without mainland China connections and/or with a non-Chinese first name)**

Effects on Enrollment Extend Beyond Those Directly Targeted

- Ethnically Chinese trainees *not from mainland China* are also less likely to enroll in a U.S. PhD program after 2016

DV = 1{Enrolls in U.S. PhD program}		
	Treatment = ethnically CN with CN tie	Treatment = Ethnically CN without CN tie
Treat x Post-2016	-0.0393*** (0.00958)	-0.0226*** (0.00904)
Field FE	Y	Y
Cohort FE	Y	Y
Country FE	Y	Y
N	123877	113336
Mean DV	0.233	0.236
Model	OLS	OLS

Effects on Productivity Extend Beyond Those Directly Targeted

- Ethnically Chinese scientists in the U.S. *without a mainland China tie* also see productivity decline
- As do those with a non-Chinese first name

DV = # of Pubs			
	Treatment = ethnically CN with CN tie	Treatment = Ethnically CN without CN tie	Treatment = Ethnically CN with non-CN first name
Treat x Post-2016	-0.0815***	-0.0865***	-0.0553***
	(0.00906)	(0.0183)	(0.0113)
Field FE	Y	Y	Y
Cohort FE	Y	Y	Y
Country FE	Y	Y	Y
N	1828988	1636859	1722322
Mean DV	1.083	1.079	1.084
Model	Poisson	Poisson	Poisson

Evidence of a chilling effect

1. Timing: Our effects begin to emerge in 2016, although formal policies didn't come until 2018 (China Initiative, US-China Trade War, Chinese visa restrictions)
2. Survey results suggest high levels of fear and uncertainty among ethnically Chinese scientists in the US
3. No increase in visa denials in 2016 for Chinese nationals relative to other international students
4. Effects extend beyond those directly targeted…(those without mainland China connections and/or with a non-Chinese first name)
5. **Mobility effects are larger in Republican-leaning "red" states**
   - **FOIAed application data from two universities (one blue + one red) shows a decline in Chinese student *applications* to the red university**

Heterogeneous Effects by Political Climate

	ln(# of Applications)	
	(3) Blue State Univ.	(4) Red State Univ.
Treatment = Ethnically CN		
Treatment = Nationally CN	0.164	0.167
	(0.177)	(0.112)
Treatment × Post-2016	0.305	$\boxed{-0.381}$
	(0.249)	$\boxed{(0.156)}$
Unit of Analysis	Degree Program-Year	Degree Program-Year
Fixed Effects	Y	Y
Model	OLS	OLS
Mean DV	3.181	2.659
Observations	377	709

- Using department-level Ph.D. application data from two universities
- Sharp decline in Chinese applications at a red state university

→Interest drops at the *application stage*

Wrapping up

U.S.-China tensions have (asymmetrically) impacted science and scientists in both countries:

- **Enrollment:** 15% decrease in ethnically Chinese PhDs in the U.S.
- **Retention**: 4% decrease in staying post-grad
- **Knowledge**: 11% decrease in Chinese scientists using U.S. works
- **Productivity**: No decrease in CN productivity; 8-11% decrease for eth Chinese in U.S.

- Evidence that effects are driven by broader chilling effect for ethnically (not just nationally) Chinese researchers
  - See a negative hit to science BEFORE any formal policies take place
- Broader implications: in today's environment, with broad visa cancellations and even stronger uncertainty for immigrants, expect more extensive effects…

Questions?

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Table A3: Comparison of Researchers in Dimensions With and Without ORCID iDs

	No ORCID 10,125,703 (84.6%)	Has ORCID 1,841,893 (15.4%)	Total 11,967,596 (100.0%)
Years active after 2008	2.735	5.570	3.171
Publications (lifetime)	4.989	15.308	6.577
Pre-2016 publications	1.801	3.072	1.997
Post-2016 publications	3.187	12.230	4.579
SJR-weighted publications (lifetime)	10.334	34.811	14.102
Pre-2016 SJR-weighted publications	3.675	6.822	4.160
Post-2016 SJR-weighted publications	6.659	27.989	9.942
# of grants (lifetime)	0.071	0.252	0.099
# of research organizations (lifetime)	1.074	2.132	1.237
STEM field	0.755	0.816	0.765
HASS field	0.101	0.161	0.110
Missing field	0.143	0.023	0.125
Missing publications	0.077	0.008	0.066
Ethnically CN	0.198	0.133	0.188

Notes: This table provides summary statistics for researchers whose first publication in Dimensions was after 2008. We observe that researchers with ORCID profiles have generally stronger research attributes.

Table A4: Comparison of Researchers in Dimensions With and Without ORCID iDs, Ethnically Chinese vs. Non-Ethnically Chinese

	Non-ORCID, non-eth. CN 8,121,699 (67.9%)	Non-ORCID, eth. CN 2,004,004 (16.7%)	ORCID, non-eth. CN 1,597,553 (13.3%)	ORCID, eth. CN 244,340 (2.0%)
Years active after 2008	2.703	2.865	5.497	6.045
Publications (lifetime)	4.829	5.641	14.752	18.941
Pre-2016 publications	1.798	1.812	3.004	3.513
Post-2016 publications	3.028	3.828	11.742	15.424
SJR-weighted publications (lifetime)	9.784	12.566	32.683	48.726
Pre-2016 SJR-weighted publications	3.667	3.708	6.600	8.279
Post-2016 SJR-weighted publications	6.117	8.858	26.084	40.447
# of grants (lifetime)	0.073	0.060	0.246	0.296
# of research organizations (lifetime)	1.019	1.296	2.082	2.454
STEM field	0.721	0.894	0.797	0.938
HASS field	0.119	0.029	0.177	0.058
Missing field	0.160	0.077	0.026	0.004
Missing publications	0.078	0.073	0.009	0.004
Has ORCID	0.000	0.000	1.000	1.000
Ethnically CN	0.000	1.000	0.000	1.000

Back

Table A1: Summary Statistics for Doctoral Students Dataset

	Mean	SD	Min	p25	p50	p75	Max	Count
Ph.D. first year	2,012.79	2.88	2,008	2,010	2,013	2,015	2,019	129,223
Ph.D. last year	2,017.22	2.89	2,008	2,015	2,017	2,019	2,033	129,223
Treatment = ethnically Chinese	0.16	0.37	0	0	0	0	1	129,223
Origins								
Prior degree in U.S.	0.18	0.38	0	0	0	0	1	129,223
Prior degree in China	0.11	0.32	0	0	0	0	1	129,223
Prior degree in India	0.10	0.30	0	0	0	0	1	129,223
Prior degree in U.K.	0.07	0.26	0	0	0	0	1	129,223
Prior degree in Brazil	0.05	0.22	0	0	0	0	1	129,223
Destinations								
Enrolls in U.S. university	0.24	0.43	0	0	0	0	1	129,223
Enrolls in U.K. university	0.09	0.29	0	0	0	0	1	129,223
Enrolls in Chinese university	0.07	0.25	0	0	0	0	1	129,223
Enrolls in Indian university	0.08	0.27	0	0	0	0	1	129,223
Enrolls in Brazilian university	0.04	0.20	0	0	0	0	1	129,223
Enrolls in non-U.S. anglo. university	0.17	0.37	0	0	0	0	1	129,223
Research fields								
Science & Engineering program	0.79	0.41	0	1	1	1	1	129,223
Medicine/Health program	0.21	0.41	0	0	0	0	1	129,223

Notes: This table provides summary statistics for the Doctoral Student dataset. The unit of observation is an individual student enrolling in a doctoral program. The sample includes only students enrolling in STEM (Science, Technology, Engineering, and Medicine) programs. We discard observations for students who began Ph.D. programs 10 or more years after finishing their prior degree.

Table A2: Summary Statistics for U.S. Graduates Dataset

	Mean	SD	Min	p25	p50	p75	Max	Count
Job first year	2,014.92	3.16	2,008	2,013	2,016	2,018	2,019	50,890
Graduation year	2,014.46	3.30	2,005	2,012	2,015	2,017	2,019	50,890
Ethnically CN	0.18	0.38	0	0	0	0	1	50,890
Terminal degree is Ph.D.	0.71	0.45	0	0	1	1	1	50,890
Lag from degree to job	0.46	0.80	0	0	0	1	3	50,890
Destinations								
Job in U.S.	0.85	0.35	0	1	1	1	1	50,890
Job in U.K.	0.01	0.10	0	0	0	0	1	50,890
Job in Canada	0.01	0.11	0	0	0	0	1	50,890
Job in Germany	0.01	0.09	0	0	0	0	1	50,890
Job in China	0.02	0.14	0	0	0	0	1	50,890
Job in non-U.S. anglo. country	0.03	0.16	0	0	0	0	1	50,890
Research fields								
Science & Engineering program	0.77	0.42	0	1	1	1	1	50,890
Medicine/Health program	0.23	0.42	0	0	0	0	1	50,890

Notes: This table provides summary statistics for the U.S. Graduates data set. The unit of observation is an individual student graduating from a U.S. institution. The sample includes only students graduating from STEM (Science, Technology, Engineering, and Medicine) programs. We retain observations only for graduates whose first post-graduation job begins within three years of graduation.

Table A5: Summary Statistics for Publication-Citation Shares Dataset

	Mean	SD	Min	p25	p50	p75	Max	Count
Citing U.S.	0.50	0.50	0	0	.5	1	1	4,247,176
Share of raw references	0.13	0.15	0	0	.0667	.2	1	4,247,176
Share of recent references	0.09	0.15	0	0	0	.125	1	4,051,996
Share of frontier references (1%)	0.19	0.28	0	0	0	.333	1	3,341,386
Share of recent frontier references (1%)	0.16	0.29	0	0	0	.25	1	2,309,406
Citing paper attributes								
Publication year	2,015.69	2.56	2,011	2,014	2,016	2,018	2,019	4,247,176
Number of fields	1.24	0.46	1	1	1	1	5	4,247,176
Field: biology	0.11	0.31	0	0	0	0	1	4,247,176
Field: biomedical	0.21	0.41	0	0	0	0	1	4,247,176
Field: chemistry	0.20	0.40	0	0	0	0	1	4,247,176
Field: engineering	0.38	0.48	0	0	0	1	1	4,247,176
Field: health	0.02	0.15	0	0	0	0	1	4,247,176
Field: physics	0.07	0.26	0	0	0	0	1	4,247,176
Science & Engineering program	0.81	0.40	0	1	1	1	1	4,247,176
Medicine/Health program	0.22	0.42	0	0	0	0	1	4,247,176

Notes: This table provides summary statistics for the Publication-Citation Shares data set. The unit of observation is a publication-citation share to U.S.- or U.K.-produced papers. Citing publications belong to STEM fields and are written by Chinese research teams.

Table A6: Summary Statistics for U.S.-U.K. Publications Dataset

	Mean	SD	Min	p25	p50	p75	Max	Count
Publication year	2,015.05	2.59	2,011	2,013	2,015	2,017	2,019	2,847,700
Number of fields	1.25	0.48	1	1	1	1	5	2,847,700
U.S. publication	0.83	0.38	0	1	1	1	1	2,847,700
Share of raw citations to China	0.02	0.04	0	0	0	.0137	1	2,847,700
Share of recent citations to China	0.03	0.07	0	0	0	0	1	2,769,843
Share of frontier citations to China (1%)	0.01	0.06	0	0	0	0	1	2,361,343
Share of recent frontier citations to China (1%)	0.02	0.09	0	0	0	0	1	1,836,702
Share of references citing U.S.	0.47	0.22	0	.324	.48	.622	1	2,847,700
Share of references citing U.K.	0.08	0.14	0	0	.0417	.103	1	2,847,700
Research fields								
Field: biology	0.14	0.35	0	0	0	0	1	2,847,700
Field: biomedical	0.48	0.50	0	0	0	1	1	2,847,700
Field: chemistry	0.08	0.27	0	0	0	0	1	2,847,700
Field: engineering	0.13	0.34	0	0	0	0	1	2,847,700
Field: health	0.15	0.35	0	0	0	0	1	2,847,700
Field: physics	0.06	0.24	0	0	0	0	1	2,847,700
Science & Engineering program	0.48	0.50	0	0	0	1	1	2,847,700
Medicine/Health program	0.57	0.50	0	0	1	1	1	2,847,700

Notes: This table provides summary statistics for the U.S.-U.K. Publications dataset. The unit of observation is a publication authored by a U.S. or U.K. research team. The sample includes only publications associated with STEM fields. Publications with no citations are discarded.

Table A7: China-based Researcher Panel Descriptive Statistics: CEM Matching Variables

	(1) All	(2) Matched	(3) Matched-Treated	(4) Matched-Untreated
Num Pubs in 2008-2012	13.38	8.081	8.135	8.027
	(10.41)	(4.124)	(4.147)	(4.101)
Career Age	7.322	5.895	5.953	5.837
	(4.419)	(3.449)	(3.533)	(3.363)
Num Active Years in 2008-2012	3.825	3.429	3.429	3.430
	(1.076)	(1.012)	(1.013)	(1.011)
1[University]	0.655	0.657	0.657	0.657
	(0.475)	(0.475)	(0.475)	(0.475)
1[Tier 1 Cities]	0.352	0.348	0.326	0.370
	(0.477)	(0.476)	(0.469)	(0.483)
1[New Tier 1 Cities]	0.344	0.351	0.351	0.352
	(0.475)	(0.477)	(0.477)	(0.478)
Growth Rate of Num Pubs 2008-2012	-0.000222	0.0135	0.0130	0.0140
	(0.194)	(0.190)	(0.196)	(0.184)
Num Pubs	4.481	2.405	2.391	2.418
	(5.120)	(1.546)	(1.552)	(1.539)
Growth Rate of IF-wt Pubs 2008-2012	0.0114	0.0300	0.0284	0.0316
	(0.254)	(0.248)	(0.253)	(0.244)
Num Impact Factor Weighted Pubs	9.680	4.605	4.402	4.807
	(13.20)	(3.457)	(3.332)	(3.567)
Observations	132,272	11,977	5,994	5,983

Notes: Standard deviation in parentheses.

Table A9: U.S.-based Researcher Panel Descriptive Statistics : CEM Matching Variables

	(1) All	(2) Matched	(3) Matched-Treated	(4) Matched-Untreated
Num Pubs in 2008-2012	9.604	4.055	3.898	4.750
	(16.44)	(5.253)	(5.092)	(5.867)
Career Age	10.53	4.490	4.353	5.096
	(9.885)	(4.374)	(4.224)	(4.939)
Num Active Years in 2008-2012	2.921	2.070	2.020	2.290
	(1.509)	(1.250)	(1.224)	(1.335)
1[University]	0.445	0.431	0.422	0.469
	(0.497)	(0.495)	(0.494)	(0.499)
Fraction of Foreign Coauthors	0.115	0.0163	0.0135	0.0288
	(0.197)	(0.0709)	(0.0643)	(0.0935)
Num of Distinct Foreign Coauthors	3.980	0.311	0.247	0.593
	(11.66)	(1.540)	(1.325)	(2.236)
(mean) subj_code	34.99	33.86	33.74	34.41
	(5.591)	(4.443)	(4.310)	(4.956)
Num Chinese Collaborator	0.287	0.0552	0.0189	0.216
	(1.990)	(0.557)	(0.283)	(1.140)
Growth Rate of Num Collab 2008-2012	0.0347	0.0333	0.0336	0.0324
	(0.562)	(0.539)	(0.544)	(0.519)
Num Collaborator	12.66	7.888	7.696	8.743
	(17.97)	(6.756)	(6.571)	(7.464)
Observations	675,195	231,264	188,755	42,509

Notes: Standard deviation in parentheses.